

Healdsburg Indians

(California)

KANGAROO RATS ON RUSSIAN RIVER, CALIFORNIA

Indians of the Healdsburg region on Russian River tell me that Kangaroo Rats (Dipodomys californicus) are fairly common there and that some years they are very abundant. They tell me also that at times of high water hundreds are drowned out of their burrows on the lowlands and carried away by the current, taking refuge on little islands in the river. Here the Indian boys hunt for them, at times killing large numbers. The meat is excellent eating. - *Cum*

4/15/1911

Healdsburg Indians - Oct. 1922. [Ask about Livantalome]

Permanent residents:

Joe McClelland + family ^{son Marion McClelland (P.O. Healdsburg)} (Miyakama). On John Manally's ranch on south side Russian River loop opposite Fitch Mt. lives with a bunch of about 20 women + children on the slope south of the ranch house. About a dozen babies + children here. [1926-27 reconstruction S.E. of Tantan bridge, on Russian River]

Leroy Thompson + wife (Miyakama)

Henry Maximilian + wife (Kakt-ä-we chumini). Also on John Manally's ranch but keep a much further east + up on the south side of a big hill south of the road (near 2^d gate).

Miss Alice Howard - Nurse - Alex Kelly, Indian. | Mamie Brown

Visiting Indians: Kah-chi'-ahs from Stewart's Point, picking berries on Hitchhiker's ranch. Lot of 'em camped on Russian River on ranch. Included Lib Jarnie + family. The chief, Kakt-Smith, works on Cox ranch on ^(other side of river.)

Healdsburg region (contd.)

Frank Carillo & wife heard - said to be Hookooēko.

Healdsburg

Oct. 1922 [Ask abt. Livantalome]

Permanent Residents:

Joe McCloud & family (Miyakma) -- Son Marion McC.
P.O. Healdsburg. On John Nanally's rch. on S
side Russian Riv. loop opposite Fitch Mt.
Lives with abt. 20 women & children on slope
S of rch. house. [In 1926-27 on res. 5 m S
of Jimtown bridge, on Russian Riv.]

Leroy Thompson & wife (Miyakma)

Henry Maximilian & wife (Kaht-ā-we-chum'-mī)

Also on J. Manally's rch but nearly a mile
farther E & up on the S side of a big hill
S of road (near 2nd gate).

Mamie Brown, Kaht-a-we-chum-mī.

Miss Alice Brown -- Nurse -- Alex. Val. Indians

[over

Visiting Indians: Kah-ehi'-ahs from Stewarts Pt.,
picking prunes on Hotchkiss rch. Many camped
on Russian Riv.

Gib Jarnie & family (worked by me)

Robt. Smith (chief) works on Cox rch., other side
of river. [Not Kachia - came from Bodega Bay]

Frank Carillo & wife Maud--said to be Hookooeko.

Other at picking time.

Healdsburg region

Permanent:

So'-dē'-ah + Dry Creek

Kaht'-ah-wa

Miyakuma { on River 5 miles below
Jintona bridge

Hookooē'-ko

Frank Carillo & wife and

2 others at prune picking time

~~Visiting to live:~~

~~Kah-shi'-ah~~ ~~Estimate point~~
~~to pick hops & prunes~~

Mendocino

California

80/18

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INDIANS OF MENDOCINO COUNTY CALIFORNIA

William Kent in an article entitled 'In The Mountains of Mendocino' published in the October number of the Yale Review 1925, has much to say concerning the Indians. Among other things he states:

"They were probably the most harmless and least warlike of all our aboriginal inhabitants. They did not possess the art of making pottery, but wove water-tight baskets of willow roots in which they cooked by dropping in red-hot stones. They lived by hunting and fishing and obtaining native produce. They had no agriculture.

"In their attacks on grasshoppers they either built a long low hedge of inflammable sticks, herded the grasshoppers through the flames to the end of singeing their wings; or if the earth were soft, stuck a round stick in the ground, which, by being revolved created a small pit, large at the top and bottom like an old-fashioned backgammon dice box. They placed these pits at intervals with a brush screen between and drove the insects into them. The hoppers were slightly toasted before being eaten, as were the oak-eating caterpillars, which were also esteemed.

"In their pursuit of yellowjackets and their larvae they took lesson from the bear, which, having found a yellowjacket hole, proceeded to beat down on it with alternate paws, humming pleasantly during the process.

When the last of the outcoming yellowjackets were smashed, the comb containing the larvae and their food supply was dug up and eaten with great relish. The Indians, on their part, obtained heavy leaved evergreen branches and, sitting one on each side of the hole, alternately smote the enraged parents as they appeared, humming in careful imitation of the bear. The larvae and comb were dug up, treated with a little fire, and greatly prized.

"One of their chief foods was acorns, and they managed to soak out the objectional bitterness of bay nuts and buckeyes. They appreciated berries and knew the nutritive qualities of roots and grass seeds forgotten by the white man. Their tastes in meat and fish, as in other respects, they boasted, were the same as those of a bear, the most unclean feeder of all our wild animals. When they were near the ocean, their diet was largely shellfish.

"The 'midden heaps' of their villages were their burying grounds. It was a great way of 'keeping the family together.'

"As far as the Spanish missions reached to the north, clear from California Baja to the neighborhood of Sonoma, the Indians had been brought into the fold and their souls saved by forcible missionary work with occasional employment of the reata. Once captured, they settled down to a sort of pious serfdom not ill befitting their mild and unambitious natures. Beyond the field

of the missions, however, they were found by the early pioneers living quietly their inoffensive lives with a somewhat communistic regard for the rights of property.

"The early settlers found them, murdered them, intermarried with them, sold them liquor, and generally messed up the situation. Never were people more undeservedly misused; it was and is a national disgrace."--pp.83-84.

Kent states further that when camping on a fishing stream a band of about seventeen Indians called by him Wylackie, passed his camp on a fishing expedition. Continuing he states:

"We talked matters over with a can of tobacco and a package of cigarette papers in the midst, and entered into a treaty which was faithfully observed. We on our part requested and were allowed unmolested possession of a number of pools in which we had discovered fish. This was acknowledged as fair inasmuch as we had arrived first. In the rest of the streams the Indians were to fish as they saw fit.

"Before beginning the fishing operations it was incumbent upon them to eat up five small deer which they had brought into camp. This was a worth-while performance. The deer were skinned and hung up near the fire. The Indians sat around, each with a sharpened stick. They went to the pendent carcasses and cut off strips which

they then partially broiled and swallowed, and continued in this occupation without napkins or finger-bowls for about fifteen hours, at which time they exhibited considerable distension. From time to time, the stripped bones were handed out to the nondescript dogs that always signalize an Indian camp. After this sumptuous repast, both people and dogs were able to endure several days of fasting without complaint.

"However, after a due allowance of sleep, our friends went out for fish, and it was a most interesting performance. Out of respect for us they refrained from the easy use of dynamite and put in practice an ancient method of getting results.

"Going to a deep pool in a rocky cleft they beat upon the water with branches, threw in stones, and scared the school of fish until like so many small trout they took refuge under the banks. Then an able-bodied Indian stripped and taking in his hand a small scoop net without a handle, dived down into the icy depths. He swam under the rocky bank until only his legs were visible in the clear water. He succeeded in getting a big fish into the net and came in triumph to the surface to drag him out in shallow water. We who considered ourselves fishermen were forced to praise and admiration of such a feat. I commend it as real sportsmanship."--pp. 87-88.

The Indians referred to were probably members of the so-called Wylakke tribe -- a division of the Athapaskan stock inhabiting the mountains north of Round Valley, Mendocino County, California

Mohave

California

ALK

NUEZ: MORAGA'S EXPEDITION TO THE MOHAVE DESERT, 1819

In 1819 Lieutenant Gabriel Moraga led an expedition from San Gabriel Mission for the purpose of punishing the Amajabas (Mohaves). Father Joaquin Pasqual Nuez accompanied the expedition as chaplain and kept a diary. The expedition did not reach their destination but traveled some 150 miles in a general northerly direction from Cajon Pass. The account mentions the following rancherias: Amuscopiabit, Atongaibit, Angayaba, Cacaumeat, Cucamonga, Guapiabit, Sisuguina, and Topipabit; also the following water-holes: Atsamabeat, Chichinipabeat, Guanachiqui, Patsoboabuet, and Uchique.

The following translation was made in 1917 from a copy of the Nuez diary in the Bancroft Library entitled : Diario del Fr. Joaquin Pascual Nuez, ministro de San Gabriel y capellan de la expedicion para los Amajabas, emprendido por el teniente Gabriel Moraga en 22 de Noviembre de 1819, MS. Arch. Sta. Barbara. Vol. IV, pp. 137-152, 1806-1821.

The translation was carefully compared in 1919 with the original diary at the Mission of Santa Barbara entitled: Diario de un expedicion que el Tente Don Gabriel Moraga emprendidio para los Amajabas, y que forman el Capellan de ella, P. Fr. Joaquin Pasqual Nuez de esta Vision de San Gabriel en 19 Nov.^e del año 1819, 10pp. 8vo. MS, Nol 774.

Typographical errors in rancheria names in the copy of the diary at the Bancroft Library are here given in footnotes.

Dr. H. I. Priestley in an article on Expeditions sent out from the California Missions (in galley proof, unpublished) gives an abstract of this diary. He does not attempt to identify the desert route of this expedition, merely saying "that in all probability a direct course toward the Mojave villages was taken."

An account of the expedition with an abstract of the Nuez diary is given in Bancroft, Hist. of Calif., II, p. 37, 1885.

MORAGA'S EXPEDITION FROM SAN GABRIEL TOWARD THE AMAJABES
ON THE COLORADO, 1819

The following is a free translation of the diary of Fr. Joaquin Pasqual Nuez, Padre at San Gabriel Mission, kept on the expedition which he accompanied under Lt. Gabriel Moraga sent out from San Gabriel to punish the Amajabas on the Colorado River in 1819.

Nov. 2, 1819.— . . . about 8 in the morning we (139)
set out for a ranch called La Puente, 4 leagues away.
There was a furious N wind and we all arrived at the
ranch covered with dust at about 12 o'clock. We remained (140)
at La Puente until the following day and suffered cruelly
during the night from the N wind.

Nov. 23.— At 7 of the next morning which was not
less cold than the night before, the expedition set out
from the rancho of La Puente to a place called Cucamonga
about 8 leagues away from the rancho. . . We named it
Na. Sra. [Nuestra Senora] del Pilar de Cucamonga.

Nov. 24.— At seven in the morning we set out for
the mouth of the Cajon de Amuscopiabit about 9 leagues
away. . . . Named it Cajon de San Gabriel de Amuscopiabit.

Nov. 25.— Set out at 7 with a N wind and passing
the cajon to the right of a large pointed hill arrived
at 12 at the rancheria of Guapiabit, distant from the
cajon about $9\frac{1}{2}$ leagues. . . . Named the rancheria Na,
Sra. de Guadalupe de Guapiabit.

✓ El Cajon Cañon (Priestley)

Nov. 26.-- Remained in Na. Sra. de Guadalupe de Guapiabit (141) to rest our tired mules, there being enough grass. Very cold.

Nov. 27.-- The cold continuing we set out at 6:30 from Na. Sra. de Guadalupe de Guapiabit, and after having gone 10 leagues through very dry sterile country, we arrived after dinner in the rancheria of Atongabit. A league and a half away we found ^{the place} where some of the Amajaba had killed 4 Christian Indians, 3 of them from San Fernando and some gentiles. We found some burned skeletons and skulls and pitched our camp nearby. . . . We named this place Las Animas Venditas de Atongaibit. (142)

Nov. 28.-- [Buried the remains of the Christians with suitable ceremonies]. A little while before doing this, a gentile Indian from the rancheria of Angayaba appeared and confessed to having left Amajaba 7 days previous, and after due consideration the commander decided that he should come with us as our guide.

Nov. 29.-- At 7 in the morning the expedition set out from Las Animas Benditas de Atongaibit. About 8 leagues away is the rancheria of Topipabit, without any inhabitants. ^{El Dulcissima Nombre de} We named it Asens de Topipabit. About a league further on we found the bones of a gentile Indian and a little farther the skulls and bones of three children. (143) About 3 leagues from Topipabit is the rancheria of

✓ Cacaument called by us San Hilario, which name the com- (143)
mander of the expedition gave three years ago. . .

Nov. 30.-- When the clouds lifted at about ten o'clock we
set out, and at about 11 we passed the rancheria called
by the natives Sisuguina, which in our Spanish language
means rancheria of the devil. They say that he appears
to them with great frequency. About quarter of an hour
before coming to the rancheria we found the bones of an
adult gentile fairly fresh, whom we knew had been killed
by sticks, because clinging to the bone were some chips
of macetas [handle of stick] that the Anajaba use. It
is 4 leagues away from San Ilario, the place where we
started from. We called Sisuguina the rancheria of
the ^{San} Arcangel/Miguel.

Dec. 1.-- At 6 in the morning we set out from the ranch- (144)
eria of the Arcangel San Miguel for [✓] Argayaba some 14 or
15 leagues away over very nitrous land. About halfway
we found the bones of an adult gentile. We left 16 worn-
out beasts on the road. We named it the rancheria of
San Joaquin y Sta. Ana de Argayaba.

Dec. 2.-- Learning from the Indians that water was
very scarce from here on until a day's journey from
Anajaba, the commander of the expedition determined
to go on with 10 soldiers and 4 of the citizens that came
with us. After traveling all day and the greater part
of the night we were disconsolate at not having gone
further, the beasts that we took being utterly worn

Spellings in Bancroft Library copy : [✓] Cacaument; [✓] Argayaba

out because pasture was lacking and even water for some of the horses of the expedition; and after passing a water hole sufficiently abundant and even with pasture called Atsamabeat we spent the night at another called Guanachiqui. (144)

Dec. 3.— The commander decided to return to the camp at San Joaquin y Santa Ana, but as fortune willed, found 4 adult gentiles, 3 married and one a boy of 13 or 14 years, who terrified were wandering about with 7 women and 3 little children, one boy of about 8, another of 6 and a half and a little girl of five, whose father had been killed and whose mother had been taken captive by some Amajaba. The commander sent the interpreter, Indalerio, and the gentile guide, in search of his father, who was in company of another old man, thought to be very near the water. (145)

Dec. 4.— Five Christians were sent in search of the two old men, one of whom was blind, the other crippled and we remained in Guanachiqui all day awaiting the Interpreter Indalerio and the gentile guide.

Dec. 5.— The commander sent 4 soldiers and a chief in search of Indalerio and the guide. The soldiers found the Christian Indians who went to search for the two old people on the road with spurs in their hands. They said they found Indalerio dead with three wounds, the first in the throat, another in the chest and another in the temple. It was thought that the boy sat down to

eat pinole and ^{the} gentile came up from the rear and killed (146) him. The gentile had taken Indalerio's sombrero, lance and horse together with the bow and arrow taken from the body. They did not find either of the two old people and presumed they had gone by horse to Amajaba. The Christians buried the body and erected a cross over it. This unfortunate news came to us at half past eleven at night.

Dec. 6.-- Before leaving San Joaquin y Santa Ana de Angayaba, Ysidro Alamis found the skull and skeleton of an adult Indian. . . At seven in the morning disconsolate at not being able to go to Amajaba we set out to return by a place where there was enough water below a hill of red stone very like the stones of molino [mill] and remained there all day. We called it San Rafael.

Dec. 7.-- The expedition set out for San Hilarie and camped (147) there at night.

Dec. 8. . By nightfall came to Las Animas Benditas de Atongaibit with 27 beasts worn out.

Dec. 9.-- Rested at Las Animas where there was enough pasture.

Dec. 10.-- The expedition set out from Las Animas Benditas de Atongaibit for Na. Sra. de Guadalupe de Guapiabit. . . .

Dec. 11.-- Set out from Na. Sra. de Guadalupe de Guapiabit (148) for El Cajon de San Gabriel de Amuscopiabit and suffered

in the morning from extreme cold. We did not pass the night in the cajon because of the scarcity of pasture, but went to a place about a league away where there was abundant pasture. We named this place La Beatísima Trinidad.

Dec. 12.— Went to Na. Sra. del Pilar de Cucamonga.

Dec. 13.— The commander dispatched the troop and the horses to the Mission because the land belonging to the Rancho de la Puente was lacking in grass. This gentleman and I spent the night in La Puente and on the 14th at midday arrived at that of La Lucha.

The rancheria of Amajaba according to the road which we 149 took from the above-mentioned San Joaquin y Santa Ana de Angayaba and the information of the Indians is much to the N of San Gabriel. On the way the variation of direction as far as Angayaba was very slight, although sometimes we went to the NE, again to the S, again to the E and to the W, but on the whole very little because we economized by going by an arroyo from Las Animas Beneditas de Atongaibit almost to Angayaba, cutting off the mountain without using any other road, but in the main we always traveled N. This land is very sterile. In proof of it — all the way we did not find any little birds or anything we could eat. If we go out again to punish the people of Amajaba I am of the opinion that more than 30 leagues may be avoided by setting out from the Mission of San Fernando, and that on no account should such an expedition be attempted until spring. . . .

It is a pity that from the water-hole of Guanachique

Nuez 7

up to the last, named Patcoboabuet, at no time of the year (149) is there pasture, but from Guanachiqui the horses could very well be sent to Patcoboabuet if they had some maize or barley. At Guanachiqui, the explorers, particularly the commander agreed that by doing some work there would be sufficient water for the beasts, making some broad and sufficiently deep troughs in the soil which is pure sand. It is most difficult to give the horses water in Chichinipabeat, so the Indians say, because there it is very scarce and the spring of water is among rocks. . The distance from (150) Chichinipabeat to Guanachiqui is some 8 leagues more or less and from there to another water-hole called Uchique the same. (151) where they say there are three places, the soil being very sandy, where it appears there would be no great difficulty with proper tools in getting sufficient water for the horses. From Uchique to Patcoboabuet it is some 8 or 9 leagues where there is an abundance of grass and a river where the horses could get plenty of water and rest and go on to Arajaba refreshed to punish the insolence and perfidy of these natives.

Moreover (as they live between the arms of the Colorado River) it would be a great triumph if we could succeed (152) in burning their plantings of wheat, maize, frijol, and tornillos.

Mission del Arcangel San Gabriel, Dec. 16, 1819

Fr. Joaquin Pasquel Nuez

CHIEF OF MOHAVE INDIANS

Antonio Francisco Coronel (who settled in California in 1834) In Recollections dictated for the Bancroft Library, states that in 1839 the name of the chief of the Amajaves was Guatabalote, which means 'horse-hide'.

Antonio Francisco Coronel, Cosas de California [California Affairs], MS, Bancroft Library, p. 189, 1877.

YUMA CHIEFS

Antonio Francisco Coronel (who settled in California in 1834) in Recollections dictated for the Bancroft Library, states that in 1839 Charague was the name of the chief of the Yuma Indians; ~~and~~ that the chiefs of the rancherias at the mouth of the Colorado River were Martin or Cartucho and Piedras Negras; and that Francisco was a chief of the rancherias of Lower California.

Antonio Francisco Coronel, Cosas de California [California Affairs] MS, Bancroft Library, p. 189, 1877.

Sect I -

Followers of The Way

Sect II -

Sect III - Remnant People

Sect IV -

VISIT OF MOHAVE CHIEF TO LOS ANGELES IN 1861.

J.J. Benjamin, writing about his trip to California, mentions the following episode in connection with his stay in Los Angeles:

"A visit paid to Los Angeles by the king of the Mohave Indians was very welcome to me, as I was delighted to make the acquaintance of that gentleman. He arrived on January 10, 1861, accompanied by an eighteen-year old Indian youth, and the impression he created was very unique. His feet were bare, his body was covered by a red collar and a dirty shirt. His face was painted, in accordance with the Indian custom. He bore the name of Herry Tybee. A companion, who spoke broken English, served as interpreter. I was not a little surprised to see these dependants sitting on the shoulders of their master. Upon making inquiries respecting this procedure, I was informed, that that was a sign of respect extended by dependents to their lords. By this means they convey that the king, who for a short period bears them on his shoulders, is their only help.

As a rule the king wears richly decorated scarlet robes, with feathers on his head. He wears no shoes, this part of a costume being considered by him as superfluous.

(J.J. Benjamin, 'Drei Jahre in Amerika, 1859-1862.' Hannover, ii, 135-136, 1862.)

Mohave Desert

Chemave = ^vBanume = Beñeme

Confusion with Pitanta and Mühineyam

~~Shoshone~~
~~File~~

✓

Pasadena

California

Tongva

INDIANS OF PASADENA, CALIF.

Hiram A. Reid, in a history of Pasadena, Calif. gives the following notes about the Indians who lived in the vicinity of Pasadena, including identification of the locations of some of the villages mentioned by Hugo Reid in his articles about the Indians, first published in the Los Angeles Star in 1852.

Hiram Reid states:

^ "Among Hugo Reid's writings is a list more or less complete [19 of the original native Indian names of their villages or clan settlements in Los Angeles County. Usually a clan had only one village, a central settlement; but sometimes the same clan had several villages, with an hereditary clan-chief over all, and an elected sub-chief in each village, thus forming a sort of patriarchal confederacy in government; and this seems to have been the case with our Arroyo Seco Indians when Governor Portola, the first white man here, was treated kindly by them and their head chief, Hahamovic, in January, 1770, at their village near the Garfias spring in South Pasadena. . . . And from Reid's account of the Indian villages I select a few of the localities best known to Pasadena people, or with whom they have some special interest, citing the Indian name, and its location as given by Reid, with my own notes of explanation as to present identity. The suffix 'na' was equivalent to our word clan, but was also used in a sense the same as our suffixes 'ville' or 'burg'.

Name of Indian village	Location as given by Hugo Reid	Present occupancy or identity of the site
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Acurag-na -- La presa [A large tule bog or cienega on the L. J. Rose place, above the winery, where the padres built a stone dam in 1821 and conveyed the water in a ditch to their flouring mill No.2, across the street in front of the church. The stone dam stands yet; and the foundation walls, cement flumes, wheel pit, etc., of the mill are still visible as ruins.]

Ahupquig-na -- Santa Anita Ranch, where Hugo Reid lived in 1844.

Awig-na -- La Puente.

Azucsag-na -- Azusa.

Cucomog-na -- Cucamonga.

Hahamog-na -- Verdugo ranch. [From other sources and circumstances I find that this clan occupied both sides of the Arroyo Seco from Garvanza ford northward; and when Reid wrote his account the Arroyo hills were called promiscuously the 'Verdugo hills' or 'San Rafael' hills, all lumped off as pertaining to Don Jose Maria Verdugo's ranch. These were the Indians who occupied Pasadena's location when white men first visited the country in 1769-70.]

Isanthcog-na -- Mission Vieja. [The place called 'Old Mission', at the San Gabriel River -- the site where San Gabriel Mission was at first established (September 8, 1771), but afterwards moved to its present location. Some fragments of the adobe

walls of the old first church, and other structures, may be [20
seen yet (1895), at the 'Old Mission.']

Pasinog-na -- Chino ranch.

Pubug-na -- Alamitos ranch. [The shores of Alamitos bay.]

Sibag-na -- San Gabriel. [This was at a great alluvial
marsh which formerly existed in the washway southwest of the
present village, and furnished rich crops of vegetables and
grain to the Mission while its buildings were going up at the
new location. But that body of rich marsh land has all been
washed away, leaving only fields of sand and gravel.]

Sisit Canog-na -- Pear Orchard. [The old Mission pear or-
chard, below the mouth of Wilson, Mission and San Marino
canyons -- now called the Cooper Place, where Isaac and Thomas
Cooper live.]

Sonag-na -- Mr. White's place. [Irving A. White of the
Sierra Madre colony, near, or a part of the present village
of Sierra Madre.]

Suang-na -- Wilmington. [This was the largest or most popu-
lous of the Indian villages in the county, on account of the
abundance of food, and so easily obtained from the great es-
tuary or bay there -- fish and clams, and such roots, berries
and native plant seeds as they used for food.]

Tibahag-na -- Cerritos ranch. [Site near Clearwater.]

Toybipet-na -- San Jose. [Spadra.]

Yang-na -- Los Angeles."

"The Hahamog-na clan occupied our Arroyo Seco region, and therefore 'Hahamog-na' may be set down as the first name by which Pasadena territory was ever designated in human speech; and Hahamovic was the name or title of the old native chief who smoked the peace-pipe with Governor Portola at South Pasadena, January 17, 1770. . ."

"This old chief, Hahamovic [called by the Spaniards 'Pascual el Capitan'], was head chief, and his tribe or clan had several villages at points convenient to water -- one near the Garfias [21] spring which now supplies Lincoln Park with water; one on banks of the brook east of Raymond hill; one on C.M. Phillip's place, near the head springs of Los Robles brook and Oak Knoll brook; one near the Ben Wilson and Richardson springs; one on the Giddings place near the mouth of Millard canyon, far up whose mountain course the tribe obtained their finest and fattest acorns for food; and perhaps others. Each village had its sub-chief, and these formed the 'council of elders' referred to -- a sort of cabinet or board of directors, with Hahamovic presiding. After the old chief was baptized and named Pascual, his tribe were called the 'Pascual Indians;' but later all tribal distinctions were broken up by the Mission authorities and all were blended or mixed together as 'neophytes;' or 'Mission Indians' -- and finally called Gabrielenos, to distinguish this populace from those of other Missions -- the term 'Mission Indians' having come to be applied to any body of natives who had come under

the rule of the padres. Our Pasadena chief, Hahamovic or Pascual, finally married a Spanish white woman named Angelina Sysa, resided at San Gabriel, and lived to be very old. Senora Maria Guillen de Lopez, aged 83, and still living at San Gabriel, knew him as a very old man when she was a little girl. . . ."

"These primitive people do not appear to have had any sort of domestic animals -- not even dogs or cats -- nor any sort of agriculture; but subsisted wholly upon the natural products of the land, both vegetable and animal, including the eggs of quails and other birds in their season. Nevertheless, in some respects they seem to have made real advances toward a semi-civilization, as in matters of civil polity, literature, treatment of diseases, etc. Their medical practice was combined with a good deal of superstitious mummary by the 'doctor,' such as noise of rattles, smoking [incense] to the Great Spirit, singing of songs or incantations, and other [ceremonial] antics; yet withal they did [22] have some practical and efficient knowledge of the use of sweating or steam baths, of numerous herb decoctions, of lobelia emetics, of counter-irritation by nettle blisters and by burning or 'moxa,' and of blood-letting, etc. Among the herbs which they used medicinally were Nicotiana or wild tobacco, thornapple [jimson weed], marshmallow, tansy, mustard, southernwood ['old man,' as it is sometimes called], wild sage, nettles, and some others. They also had knowledge and skill to prepare poisons for making their arrow points more deadly. . . ."

"In addition to what Hugo Reid says above, it appears [23
from other writers that they also used prickly pears
(fruit of the broad-leaved cactus), the succulent water
cress, the root of some species of flag, wild barley (or
wild oats, avena fatua) and various kinds of grass seeds --
besides birds' eggs, of which a healthy quail usually lays
from twelve to twenty in a season; and thus it will be seen
that the range of their dietary was not so very limited
after all. They also used the native wild berries, some
varieties of which are passably edible, as I have myself
tested. These are, blackberries; one species of goose-
berries; nightshade berries; some portions of the elder-
berry crop; manzanita berries; grapes; canyon bush cherries..."

"Some time during 1774-75 the San Gabriel Mission was [25
moved from the original site on the banks of the river to
its present location; but sometime before the removal one
of the 'conversions' or baptisms was that of the old chief,
Hahamovic, who had furnished food to Governor Portola's
famished party in January, 1770. He was christened by the
name of Pascual [spelled with a 'c' in Spanish but 'q' in
English]. This was a name of common occurrence in Spanish
usage; but its special adaptation to him is supposed to
have been suggested from the vast and brilliant poppy
fields within or bordering on his tribal territory, and
which the Spaniards had poetically termed the glorious
altar cloth of Holy Easter [San Pascual]. At any rate,

he was christened 'Pascual,' and being the hereditary chief of his clan, he was known to the Spaniards as 'Pascual el Capitan,' and his people as the 'Pascual Indians.' . . ."

"Pasadena's 'Sheep Corral Springs' seem to have been a [26] favorite point and place of resort among the Indians. When our colonists first came here there were some remains of a small old adobe house on the flat a short distance above the springs, at the foot of Hanaford's bluff, and an old water ditch ran from the Arroyo bed out toward the house and down through the same rich bottom land that is now in use there by Byron O. Clark as a blackberry orchard, but the ancient adobe and ditch have entirely disappeared. At that time (1874) there were some pumpkin vines and other vegetables still occupying the ground, from seed of former cultivation. John W. Wilson, I.N. Mundell, and others remember noticing the old adobe walls and water ditch, but had no idea when or by whom they were made. And Mr. Wilson says when he first came here, in 1871, there was a similar water ditch on the west side of the Arroyo bottom a short distance above Devil's Gate, and another one a little way above his adobe ranch house opposite the end of Logan street, where he resided about twenty years. These ditches, however, were long ago filled up and obliterated by vegetable growths and by sand wash from rains or overflow. They were only remnants of the improvements made by Carlos Hanewald and John Pine in 1850-51, who had bought from Don Manuel Garfias a mile square of land for \$2,000, at 48 per cent

interest. [See article on 'Complete Chain of Title of the Ranch.']

"A man known as Don Geo. Walter, who was orderly sergeant in Capt. B.D. Wilson's U.S. company of California soldiers in the Mexican war, (all captured and made prisoners in a fight at the Chino ranch house in September, 1846,) told some of our colony people that the Indians formerly had a 'sweat house' or Temescal here at the Sheep Corral springs. This was a sort of aboriginal Turkish-bath process, peculiar [27 to the South California Indians, for the cure of rheumatism and sundry other ailments, and was undoubtedly the pioneer sanitarium of Pasadena, which has been so prolific of such institutions in these later years. This native sweat-house or hot bath was operated thus: A hole was dug in the ground deep and large enough for a man to sit there in the squat posture and have it filled with water up to his waist. Over this was built a booth or hut of tules, having a small doorway that could be closed with a mat of woven rushes or some animal skin. This hole was filled with water, and from a fire outside hot stones were put into it until it was just as hot as the human body could endure, then the patient sat down in it and the door was closed, but an occasional hot stone was added to the water to produce steam and make him sweat freely. The patient was kept there about an hour. After he had been thoroughly sweated and almost par-boiled, he must rush out and dive head foremost into a ditch filled

with cold water deep enough for him to go entirely under, [27] then get out and take a lively run for a mile or two, when the blood would go rushing through the system like a race horse and the patient would feel as fine as a fresh-tuned piano. Sergeant Walter said he once went through the process there himself with the Indians; but once was enough for him. This adventure of Walter's was probably before 1846; and the Indians may have had a ditch or sluice there for their sweat-house business which was afterward utilized by Hancock and Pine in 1850, in their search for placer gold deposits in this Arroyo sandwash.

The Indians After Mission Rule Was Broken Up.

When the Missions were broken up and their lands sold by the Mexican government in 1835-36-37 most of these Indians were left landless and helpless, notwithstanding some grants made to them. Some of them worked for white people, and had some sort of a dwelling place and familyhood on the ranch where they worked; while others huddled together in fragments of tribes among the canyons and mountains, gaining a scant livelihood by stealing, begging, chopping wood, grubbing greasewood, etc. Even as late as 1884-85 the fine body of land now known as Linda Vista was called 'Indian Flat' because it had been for many years occupied by one of these fragmental Indian settlements; and there was another one in a little nook or canyon up between La Canyada and

Crescenta Canyada; besides single families occasionally found in out-of-the-way places; and all living in rude huts made of sticks, bushes, tule stalks, rushes, and perhaps some fragments of boards, old matting, bits of threadbare carpet, and other rubbish which they had picked up. . . ."

"In a letter to me July 11, 1894, Prof. C.F. Holder [31 raised this question, and I quote his remarks:

'One question has interested me greatly -- where did the San Gabriel Indians bury their dead? I have never found a skeleton, nor heard of one being found. Graves are common at Catalina and Santa Barbara; but a Pasadena place of Indian burial has not been found.'

The answer is that cremation was practised by our Indians."

Reid gives records of Indian cremations from A.S. Taylor, Gibbs, Schoolcraft, Father Boscana, Hugo Reid, and adds:

"But taking all the testimony in the case, and the circumstan- [32 tial evidence besides, I am safe in stating that our Pasadena aborigines burned their dead; and so that is why no graves or skeletons have ever been found, nor any general place of sepulture. The fact is, when the 'hut' was burned the body was burned with it. And in other cases the body was laid on a hurdle of sticks and brush over a hole in the ground, as Gibbs reports, and as the body and brushwood consumed together they dropped into the hole, and things belonging to the deceased were then thrown in also, and the cavity filled up.

This was the grave, and this is how it happens that a metate or some other stone relic is occasionally found 'three or four feet down,' as Prof. Holder says in his letter given in another chapter, while ordinarily these things are covered so shallow with vegetable mould, or drifted sand and dust, that they are turned up by the farmer's plow, which usually cuts only from six to ten inches deep.

'Old Francesca,' who was born at Los Nietos in 1794, and is still living as a resident of Pasadena, told me on September 23rd, 1894, that she had always understood that 'the Indians here burned their dead, before they became Christians;' but she had never seen it done herself.

Hiram A. Reid, History of Pasadena, 19-23, 25-27, 31-32, 1895.

Shasta

California

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SHASTAS

MYTHOLOGY

(Joaquin Miller, *Life Amongst the Modocs*, 1873)

Account of Creation (pp. 233-236)

Account of their own creation (pp. 242-246)

S H A S T A S

Mythology.

Bancroft, Native Races, III, p. 547, 1875.

Colors and Dyes used by the Shasta Indians. (3)

The Shasta Indians of Upper Klamath Canyon made their red paint, called Koo'-pah-mah, from a species of mushroom which grows on old fir trees. This was roasted to produce the color. Yellow paint, called Itch-üm'-pah-ke, was made from the inner bark of an oak, scraped off and used dry. Black paint, called Mah-ter'-rah-he, was made from charcoal rubbed up in grease. White paint, E'-ti, was made of a kind of white chalk found in the hills. The names used by the Shaste and Yreka Valley branch of the tribe for red, black, & white paints, are respectively: Oo-kwah-hah'-ch-tik, Mah-ter'-rah-he, and E'-ti.

~~The tattoo marks, called Keep'-tik by the Shaste of Upper Klamath Canyon, and Keep'-tē by the branch of the tribe inhabiting Shasta and Yreka Valleys, were made by pricking soot into the skin. The soot was scraped from an overhanging rock under which wood had been burnt. In this case, I did not ascertain the kind of wood, but with many tribes the only wood used in tattooing is the Poison Oak. - cam.~~

Necklaces of Bear Claws.

Among the Shaste Indians of Shasta and Yreka Valleys, and of the upper Klamath Canyon, necklaces of bear claws were worn by doctors only. The Shasta of Klamath Canyon near Shovel Creek call the bear claw necklace Aht-sa-loqá'-rah-hah, while the branch of the tribe living in Shasta and Yreka Valleys call it Ah'-pah'-kah-ram. -cm

(8)

Arms and Utensils of the Shasta Indians.

The bows, called How and ^{Hōw-he-yu}, ~~Hōw-he-yu~~, were made of the wood of the Yew (Taxus brevifolia). Arrows were made of young shoots of Service ~~Berry~~ bushes (Amelanchier). The blunt-pointed arrows were called Mah-gět'-se-gah'-sik; the stone pointed arrows, Ah-kēr and Ah-kēt. The stone point itself was called Hah-kwī'. The fish spear (two tined and three tined), Hē'-sah-hi; the sling, Ah-ně-he-mit; the snare, Kah-pē'-rik; the stone knife, Ah-kah'-rī; the skin scraper or dressing knife, E-dah'-chek'-ke, for which deer ribs were sometimes used. The fire drill was made of cedar and was called by the Yreka and Shasta Valley Indians, Hoo-row; by the Upper Klamath Canyon Indians, Ho-dow'-bit; the block under the fire drill was Nah-hoo.

The mortar in which the acorns were pounded consisted of a milling basket called Ik'-noo, resting on a flat stone, Hah'-too. The stone pestle had two names, To'-ko and Hahts-mut'-te. The small stone for splitting acorns was called by the Indians of Shasta and Yreka Valleys, Ope-hah'-rit; the grinding stone or Matate, Hi-yu-hō'k; the under-stone for rubbing on the Matate, Hi-e-rook. These three stones in the language of the Upper Klamath Canyon Shaste are called, respectively, Ook'-kik, Its-ski-ah-hook, and Its-skah-he-rook.

The acorn leech was called Kwah-po-am-pik; the acorn cache (woven of tules and holding about 4 grain sacks), Hah-pah'-ris-podahs.

The hot stones used for cooking in baskets are called by the Shasta and Yreka Valley Indians, Too-tah'-gahitch'-ah; the stirring stick, Ahk'-tah-wē-ke. The

two sticks for taking the hot stones out of the fire, Ah'-kwah; the digging stick, Kwahs'; the ^{chipping} ~~shaping~~ horn for shaping flints and arrow points, Wah'-pah; The bone awl used in making baskets, Ėch-wah; the brush of Soap-root fibres, Haht'; cord or rope, Po-kwe-ruts. The carrying band which passes over the forehead or front of the head, Oo-ter'; the fish net, Ah-row''; fish hook, Hah-mi-rook; dug-out canoe (burnt out of a fir log), Ėk'-we''; the paddle, Ah'-ket. - *clam*

~~NOTES FROM THE SHASTE INDIANS~~

Mortars & Pestles

Deep mortars do not appear to have been used by the Shaste, as they pound their acorns, manzanita berries, and other things in the ordinary milling basket, called Ik'-noo, resting on a flat stone called Hah-too, using a stone pestle. The pestles are of two kinds, a short kind about 6 inches long, slightly spreading at the bottom, called To-koo and Ats-mut'-tah, and a long kind about 15 inches in length called It'-ah-hoo-vi'-ik.

Acorn Caches

The acorn cache of the Shaste differs from ^{that of} most California tribes by being placed underground instead of on a rock or post or in a tree. It is in a hole dug in the ground and is covered with pine-bark.

Underground food-cache ~~called~~ Wahitch-nah

^ The Shasta & Konomicha tribes had a good sized underground
(watch'-nah)
cache for acorns, dried fish, + dried meat of Deer, Elk, & Bear.

It had a framework of posts and was made of ^{bark} bark, with leaves next to
the ground to keep out dampness. ~~can~~

Meat of Deer, Elk, + Bear was ^{roasted} cooked on coals and also
cooked in the ground oven ^(called) Hēp'-se-ro kahm'-pik.

~~NOTES FROM THE SHASTE INDIANS~~

Bird & Reptile Beliefs

The echo called Koo-che-rah-kik is believed to be a Lizard answering from rocks.

The Night Hawk they call Cho'pah-kwan-i-kook, and say that when it swoops down making the characteristic booming sound, it is stretching a fawn to make it grow, and that if a person goes to the spot beneath the diving bird they will find a spotted fawn.

The Gopher Snake or Bull Snake (Pityophis) they call A-ha'-se-sa-ket, and state that when it sticks out its tongue, it makes freckles on one's face.

The meadowlark, according to the Shaste, wears on its breast a necklace of the black seeds or nuts of the sugar pine.

~~NOTES FROM THE SHASTE INDIANS~~
~~Shasta~~ Cave on Klamath River.

When visiting the upper Klamath canyon in 1907, a Shaste woman told me about a deep cave high up on the rock cliffs on the north side of Klamath canyon in which Shaste Indians used to take refuge when pursued. A number of them resorted to this cave during a so-called war with the whites many years ago, when they were pursued by soldiers and men from Yreka. Details of this attack by the whites may be found in county histories.

The Indian woman in question offered to take me to the cave, but unfortunately I was not able to remain.

When visiting the old Shaste Chief, Bogus Tom, at his home on Deer Creek on the south side of Klamath canyon the latter part of September 1919, I inquired about the location of this cave, and was told that it is on a high promontory on the north side of the canyon nearly opposite Deer Creek.

Shaste Ceremonial House

The ^{round} ceremonial houses of the Shaste in Klamath canyon and Shasta valley were called O-kwahn'-mah. They had a large center post with four posts around the circumference. The top was covered with brush and earth.

The small sweat-houses, the frame-work of arched willow sticks over which was spread a blanket, are called Koos-took-hum'-pik. The smaller conical huts were covered with the bark of the incense cedar (Libocedrus)

Wilder Exped - 1841

"On the 22d [Sept. 1841] they began their route across the Umpqua Mountains. . . . They encamped on the plain of the Shaste country, which is divided by the mountains which they had passed, from the Umpqua Valley" [^{present}line between present Douglas & Josephine Counties]. (p. 231) Here they remained for another day searching the back trail for some of Mr. Peale's lost luggage.

On the 24th they "reached the country of the Klamet Indians, better known as the Rogues or Rascals." . . .

"The 25th, they passed along the banks of the Rogues' river, which runs on in a westerly direction; upon it the Indians were seen spearing salmon from their canoes." (233)

KLAMATH RIVER TRIBES

From the mouth of Klamath River the Lower Klamath tribe (Polikla) reaches northward along the coast for only about 6 miles, to a small stream known as Wilson Creek. Farther south, a closely related branch--calling themselves Ner-er-ner--occupy a rather narrow strip along the coast as far as Little River, thus including Gold Bluff, Orick, at the mouth of Redwood Creek, and Trinity Head and Bay.

On Klamath River the Polikla reach upstream to the mouth of Bluff Creek, 8 miles above Wetchpek, where their territory ends abruptly and that of the Karok begins. The Polikla are often called Yurok, a Karok word for 'down stream', and is the precise equivalent of Polikla, the name used by the Lower Klamath people for themselves.

Above Bluff Creek the canyon of the river is inhabited by another tribe--the Karok--speaking a different language. The word Karok in their own language means up stream. The full name is Karok arra, or 'up-river people'. The Lower Klamath people call the Karok Petch-ik-la, or up-river people.

VALLEY QUAIL A NEW COMER ON THE LOWER KLAMATH

The Poliklah, whose country lies along the Lower Klamath from Bluff Creek and Wetchpek to the sea, state that in former years the Valley Quail (Lophortyx californicus) was unknown in their country but that it came in slowly after the white man had made clearings in the forest.

The Karok of the Orleans Bar region on Klamath River say the same thing. They tell me that the Mountain Quail was common but that the Valley Quail did not appear until after the white people came. For some years after the Valley Quail began to appear, the Karok regarded them as devils and would not kill or eat them. When the Valley Quail became common, the Mountain Quail moved higher up on the mountain sides.

From the ~~very~~ large number of villages, it is obvious that the aboriginal population must have been very numerous. Gibbs, who ^{in 1851} followed Klamath River up as far as the mouth of Scott River and then visited Scott and Shasta valleys, estimated the number of Shaste Indians living at that time as about 3,000. But the chiefs from whom he obtained information ^{mentioned} ~~give~~ only 50 village grounds, of ~~which only 24 were on Klamath River;~~ and there is nothing to indicate that Gibbs had any inkling of the existence of some 30 inhabited ^{then} villages on the Upper Klamath above Shasta Valley. Some of these were small, consisting of only a few houses, but many were of good size, as I am informed by an old chief still living, who tells me that all ~~of these~~ were inhabited when he was a young man. Allowing an average of 40 persons to a village (and Gibbs allows 60), there must have been at least 1,200 Indians in Klamath canyon above Shasta Valley. This would ^{make} ~~bring~~ the total ~~Shaste~~ ^{of Shasta Indians} population at the time of the gold rush ~~up to~~ at least 4,000.

Karels

(AHS-KAHN-YOOP-SOO-KE-RAH) THE WATER PANTHER

The Water Panther is a large ^{spotted} animal ^{with} ~~and~~ has a long tail like the Cougar or Mountain Lion, ~~but it is spotted.~~ It lives in ponds. One lives in a pond on a mountain north of Orleans. Another ^{lives in a} ~~the~~ pond on Trinity summit.

Lots of deer bones lie on the mountain and about the ponds or reservoirs where he lives.

He comes out only at night.

He kills Indians by sucking the brains out of the top of the head.

Notes on Gibb's map of northwestern California (1851)

See also TBL map collection

G4360 1851.G6

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Gibbs Map of Northwestern ^{California (1851)} is entitled 'Sketch of the Northwestern part of California, accompanying a Journal of the expedition of Col. Redick McKee, U. S. Indian Agent, during the summer and fall of 1851, by George Gibbs.'

The original is on file in the Indian Office. Written on it in pencil is the following location: Map 47, Tube 123.

So far as I am aware, no map of northern California of corresponding date ('1851) approaches it in accuracy of location of Klamath, Smith, Trinity, and numerous other rivers; of Clear Lake, the largest lake in the State, and of some of the mountains. And furthermore, it shows the locations of a number of the old trails in use in the early mining days, and of four very large Indian Reservations roughly surveyed by Colonel McKee and George Gibbs, but not confirmed by the Senate.

To those of us who have to do with geographic names it is worthy of note that the main South Fork of Eel River (now traversed by the Redwood Highway) is called 'Kelsey's River'; Yreka, 'Shasta Butte City'; Stony Creek, 'Stone Creek'; Little Lake (Willits) Valley, 'Betunki Valley'; Long Valley, 'Ba-tim-da-kia Valley'; Ten Mile River, 'Marons River'; Ukiah, 'Parker's'; Hopland, 'Felix'; Healdsburg, 'Pitch's'; Cobb Mt., 'Potos Mt'; Mt. St. Helena, 'Mt. St. Helens'; Mt. Konokti, 'Mt. McKee' (after Redick McKee, leader of the expedition).

It is of both geographic and zoological interest to note that the mountain called Sheep Rock in the gold mining days was in Scott Valley on the west side of the mountains that separate Scott Valley from Shasta Valley; whereas, the Sheep Rock of more recent years is immediately north of Mt. Shasta.

Taken all in all, the map is of more than ordinary historic interest.

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Work in California

Canada

C. Hart Merriam
Papers
BANC MSS
80/18 c

October 5, 1917

Wolf Road, The Runner,

About the year 1839, ten or twelve men under a leader ^{as leader} named Standing on the Hill, set out on the warpath from the camp on the South Platte River. They went south and on the way stopped at Bent's Old Fort on the Arkansas, and there obtained guns, ammunition, blankets and new knives. Col. Bent ^{usually} ~~commonly~~ gave the Cheyennes these things on credit. He did not know all the Indians, but he knew the chiefs, and the leader of any war party commonly vouched for the men ^{with} under him. He ~~would~~ ^{gave} Col. Bent the names of the relatives of the different men and ^{laying} ~~declare~~ that if the men were killed these relations would pay their debts. As a matter of fact they always did pay.

This party crossed the Arkansas ^{and} ~~on~~ the Cimmaron and when they reached Wolf Creek turned off a little toward the east. While crossing the divide between the Arkansas and the Cimmaron Rivers they lived altogether on horse ^{flesh} ~~meat~~, for ^{on} the divide ^{wild horses were} ~~was covered with~~ ^{anywhere} horses.

Standing on the Hill, a man of great experience, ^{Told} ~~dissected~~ his young men that before they went into an enemy's camp to capture horses they ^{should} ~~must~~ thoroughly wash themselves and scour themselves with mud, ^{in order to} ~~for the purpose of getting rid of the scent~~ of the horse meat that they had been ^{using} ~~kill~~ing. Horses greatly feared the ^{smell} of this meat. ^{and} If the men ^{entered the} ~~went into~~ camp smelling of horse ^{flesh} ~~meat~~, the horses would be ^{afraid of them} ~~frightened~~ and hard to catch.

After they had crossed Wolf Creek, they saw signs where people ^{had} ~~seemed to have~~ been traveling, but they could not be sure who the people were or ^{where} ~~where~~ they were ^{going} ~~feeding~~. In order ^{To} find out about this they sent out scouts. Wolf Road, Sunmaker and Walking Coyote.

The main party stopped above the Antelope Hills on the divide between North and South Canadian, ^{and the scouts set out before} ~~it was not yet~~ daylight ^{when the scouts started out.} They were told to cross the South Canadian and go west of Antelope Hills and to look ^{over} on the Washita River, to see if ~~they could see~~ ^{could be seen} any people. The scouts obeyed ~~in~~ ^{instructions}, following up a tributary of the South Canadian, and as usual, traveled ⁱⁿ in ravines and low places. ~~The names of the scouts were Wolf Road, Sun Maker and Walking Coyote.~~

As they were traveling up this tributary stream they saw some people come up over ^a the hill. Buffalo were everywhere on the plain. The people who had come in sight rode toward the scouts and began to chase a large herd of buffalo that was not far away. The scouts ran up to the head of the ravine and hid there in a little hollow. Buffalo were falling all about them.

As the scouts lay there watching, one of them looked down the ravine and saw a Kiowa riding across the stream they had followed up. Suddenly the man stopped and turned up the stream in the direction they had come, riding slowly, looking at the ground and evidently following the tracks they had made. He ^{kept on} followed up the stream and just before he reached the place where they lay ^{hidden} he turned off their trail and rode up on a side hill ^{to look}. The scouts had determined that they must kill him as soon as he was near enough, but ~~they knew~~ that it would not do to kill him with a gun, for those who were running buffalo would be sure to hear the shot.

When the ^{Kiowa} ~~man~~ turned off the trail, the scouts crept up a little side ravine and under a bank over which the Kiowa would be

likely to come. Presently, they saw him approaching. He was looking all over the country, far off, trying to see people and rode within twenty or thirty ^{of them} feet without ^{seeing} ~~looking at~~ the scouts. All three shot at him with arrows. Walking Coyote shot his horse, Wolf Road's arrow stuck in the pommel of the saddle, and Sun Maker's passed through the Kiowa's heart under his arms. The horse gave a great plunge, the man fell off, and the three scouts rushed forward to count coup. Wolf Road reached him first, and then Sun Maker, who also received the credit for knocking him from his horse. They dragged the man into the ravine, got his horse and led it down there. Then they scalped the man and shot the horse again.

The Kiowa was wearing silver hair plates and the horse a good bridle. The scouts recovered their arrows and taking these things ^{had come to} started down the creek as they had come. When they ~~reached~~ the flat they looked back and could see some Kiowas still cutting up animals, and a few buffalo running. When they ^{reached} ~~came to~~ an open place which they ^{were obliged} ~~had~~ to cross they got close together, ^{one behind the other} stooped down and hung a blanket over themselves and walked across the flat looking like a buffalo. When they again came to the brush they ran on as fast as they could.

They reached the stream where their party was and ~~when they had come to them they~~ found everyone asleep, except one man, who was watching on the hill. They reported what they had done, and Standing on the Hill said to Wolf Road, "Now, my friend, you are the fastest runner, you must stop behind and watch the trail and we will go back. These people will look for the man who is dead and ^{may} ~~will~~ find our tracks. It will be too dangerous to go on ^{farther}."

Colorado

C. Hall-Merion
Rt. 2
Bangor, ME
05601

Yuma Indians

Sunset - June 1909.

THE USEFUL COLORADO

AT LAGUNA DAM THE BIG RIVER IS ONCE MORE HAR-
NESSED AND WILL HELP MAKE 150,000 FRUITFUL
ACRES—DETAILS OF THE PROJECT

By LOUELLA PROUTY LITTLEPAGE

Several thousand people assembled at Yuma, March 31st, and joined in celebrating the completion of the Government's great irrigation project at the Laguna dam, twelve miles above the town. This work was begun four years ago. It has cost close to \$4,000,000 and it diverts water to about 150,000 acres of land which with water should grow all products at all seasons. The structure is of the Indian weir type—the first of its kind ever attempted in this country. It is nearly a mile in length, crossing the river between rock abutments. Besides the sluices an inverted syphon will carry water under the river to irrigate land in California. The land under this project should prove as fruitful as any in the world, because of the fertile silt soil, the water and the year-around sunshine. Here's the story of it:



THE Colorado river, the most erratic and inconsistent stream in the world, has again been subdued, and its waters have been diverted into giant sluiceways which carry them around the ends of the great Laguna dam or spill them gently into the main canals of the Nation's great Yuma project.

Twelve miles above Yuma, Arizona, the Government engineers have been engaged for months constructing the most unique dam in the history of American engineering, for the control of the Colorado was one of the biggest problems which they ever undertook to solve. From its birth in the snow-clad mountains of Wyoming to its blue tomb in the gulf this king of desert streams has battled with Nature since time began. It drains two hundred and thirty square miles of territory above Yuma, tears its way through the Grand Cañon more than a mile below the surface of the earth, and then rides majestically on top of a dike which it has built up in its lower valley. In flood time the river spills over its banks, inundating the country for miles around and

covering it with a rich layer of silt. During the rest of the year the land is parched. The size and uncertainty of the river, its unstable banks and variations in volume all had to be reckoned with.

Uncle Sam decided, however, that the valley around Yuma, with its soil of inexhaustible fertility and its three hundred days of sunshine every year, was too valuable to give over to the whims of an unruly river, but when his engineers began punching holes in the river bed in search of a solid foundation upon which to build a dam and accessory controlling works, there seemed to be nothing but sand and silt between the river and China. Nothing daunted they immediately set about erecting a structure weighing 600,000 tons on the shifting sands of the river bed. The idea was borrowed from engineers of the Old World who have constructed weirs of this type in Egypt and India that have been successfully operated for fifty years.

The dam is about a mile long, 246 feet wide up and down stream, and nineteen feet high. It consists of three concrete monoliths extending across the river from mountain to mountain, filled in between with rock, and tied together with eighteen inches of concrete paving. The crest wall rests upon a row of six-inch sheet piling from twelve to twenty feet in length, incorporated at its base to



THE SPIRITUALISTIC FEAST OF THE DEAD, A THREE DAYS' FAST OF THE YUMA INDIANS

protect it against undermining currents of water. The up-stream side of the weir is protected by a talus of broken rock, with an incline of two feet horizontal to one foot vertical, and an apron of rock extends forty feet beyond the lower wall.

The Colorado seems almost human in the way it resents any attempts to control it. Only a few years ago a party of men who coveted the richness of the soil which the river had deposited in Imperial valley cut the river banks in an attempt to make those lands fruitful by irrigation. Then followed a battle which engaged the attention of the world and the best engineering skill of our country for weeks and months. The river once nearly won, but engineering skill at last triumphed.

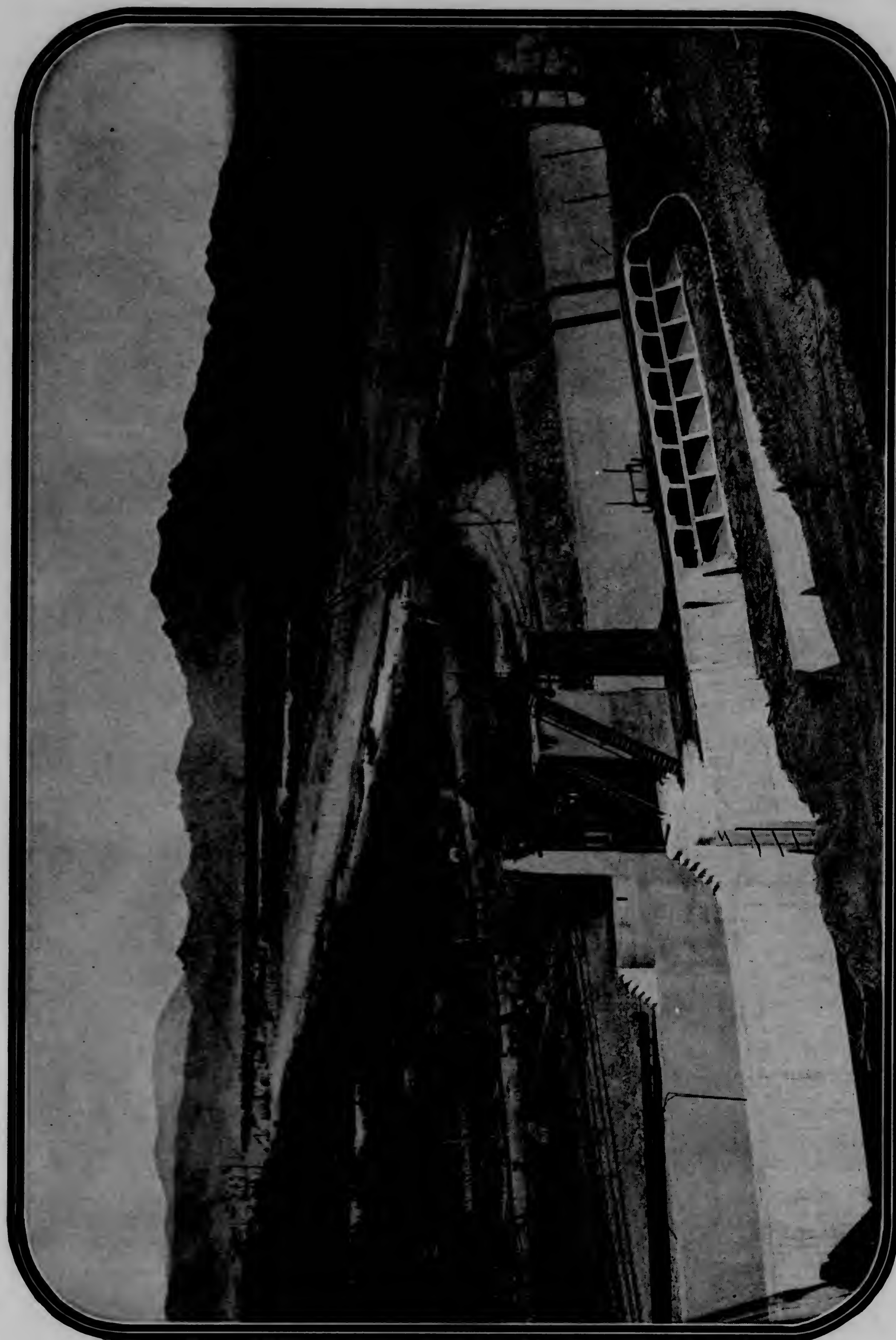
Work had been quietly going on for months on both ends of the Yuma dam until an opening of only six hundred feet remained. Two temporary railroad bridges resting on piles driven deeply into the silt of the river bed were built a short distance above the weir, and from these rock was dumped by the train load until the river was backed up and compelled to flow through the sluiceways. Hardly was the cofferdam completed when reports of a tremendous flood were received from a point up the river. All night the engineers in charge remained on the crest of the temporary dam directing the work of the men, as the entire force of six hundred laborers fought with the raging torrents. For twelve hours great volumes of water rushed through the sluiceways and flooded the surface of the dam, and although the

trackage system and machinery were flooded the cofferdam remained intact.

The Colorado carries 61,000,000 tons of silt past Yuma annually, an amount equal to eighty square miles of loose soil one foot deep. If this sediment were compressed it would make twenty-five square miles of solid rock one foot in depth. In order to keep the canals from filling up with this material immense sluiceways were constructed. On account of their great size the movement of the water toward the canal intakes will be slow, and most of the silt will settle toward the bottom of the stream. The headgates of the canals are built in the sides of the sluiceways, and are so arranged that only about a foot of water will be skimmed from the surface. By occasionally opening the sluiceways the sediment in the bottom of the sluiceways will be scoured out and carried into the river below the dam.

In order to protect the bottom lands from periodical floods a system of levees has been constructed which is considered a model of perfection. The dikes have an aggregate length of about seventy-five miles. At base they are several times as wide as they are high, and they are protected at intervals on the river side by brush defenses to ward off attacks of the stream. The tops of the levees are four feet above the highest known floods.

The engineers of the country have been watching the progress of this work with an interest second only to that which the remainder of the population is evincing in the agricultural possibilities of this marvelous valley, for reports have gone abroad of the wonderful



THE GREAT LAGUNA DAM. THE GOVERNMENT'S PROJECT AT YUMA, ARIZONA



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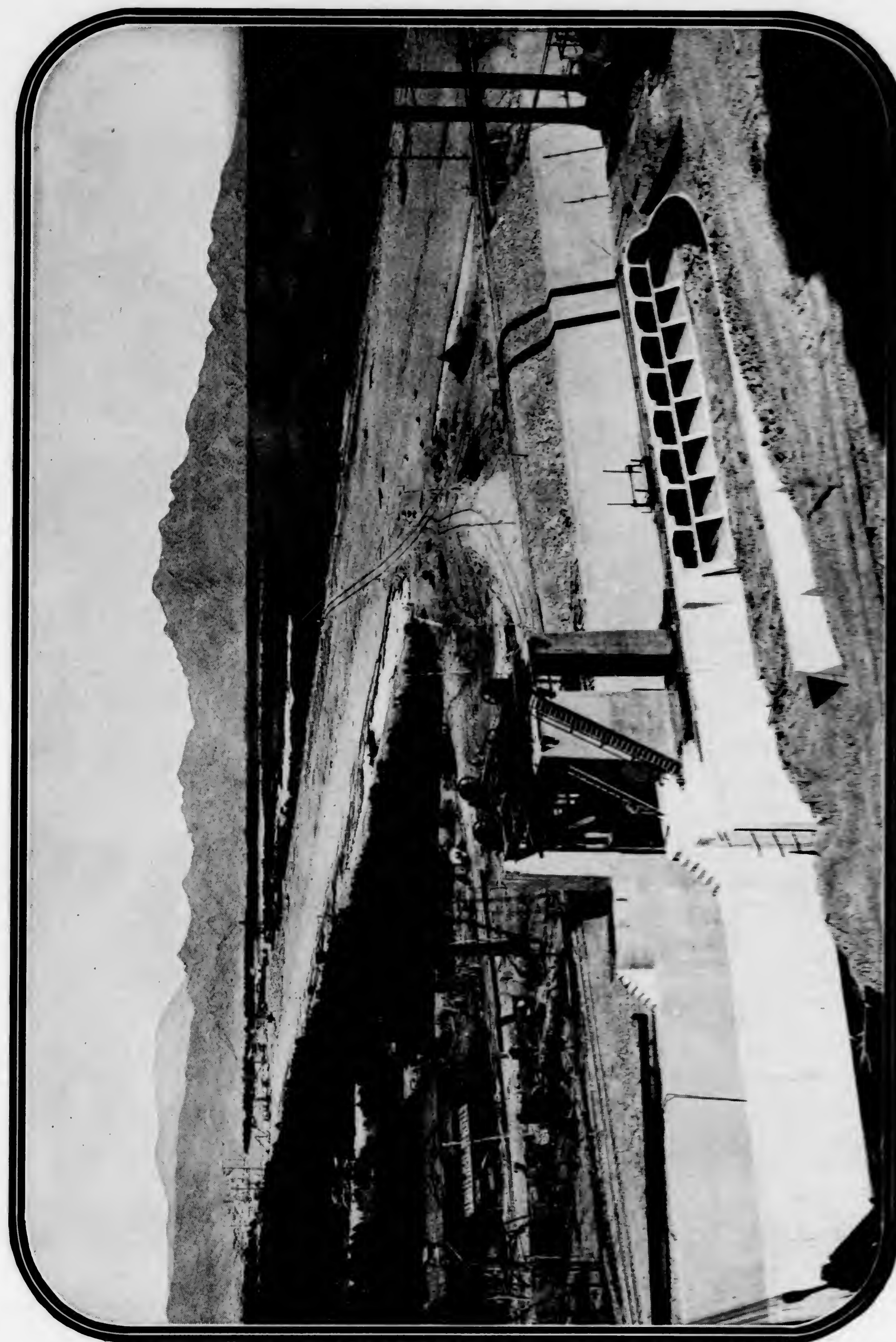
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Retake of Preceding Frame

soil, climate and products of this section. Indeed it has been likened to the valley of the Nile in Egypt where crops have been grown for at least 4000 years without lessening the productivity of the soil.

It is a land of perpetual sunshine where something is growing all the time. The harvest time lasts from January first to New Year's eve. When one crop is harvested another takes its place, so that instead of raising one crop each year the farmer may raise four. Here the date palm flourishes luxuriantly, its fruit attaining rare perfection. The trees begin to bear in about four years, but the maximum bearing stage is not reached before the tenth year. However, cantaloupes and vegetables may be raised between the rows while the trees are growing, so that no time is lost. Indeed farmers in irrigated regions where such high-priced crops are grown waste neither time nor space.

A tenderfoot from the East recently visited the southern part of California and was being shown the beauties of the country from an automobile. After riding for some time he remarked: "I had no idea your town was so large." "Town!" exclaimed his host. "Why we are ten miles from town!" So close together are the houses on these intensively cultivated farms, so beautifully kept the flower-bordered lawns and magnificent orchards, and so attractive the homes, that they seem more like the fashionable suburbs of a large city than farming communities. There is every reason to believe that with its matchless soil, perpetual sunshine, and plentiful water supply, the Yuma project in a few years will rival those sections of California which are the show places of our country and probably the most intensively cultivated and valuable agricultural lands in the world.

All the crops grown in the temperate and semi-tropical zones flourish here. Alfalfa, grains, oranges, lemons, dates, figs, grapes, plums, peaches, olives, walnuts, vegetables of all sorts, sorghum, tobacco, Egyptian cotton, melons and berries have all proven profitable. Alfalfa yields from seven to twelve tons per acre each year and furnishes good pasture all the year round. It sells at \$6 to \$10 loose in the stack and \$15 baled.

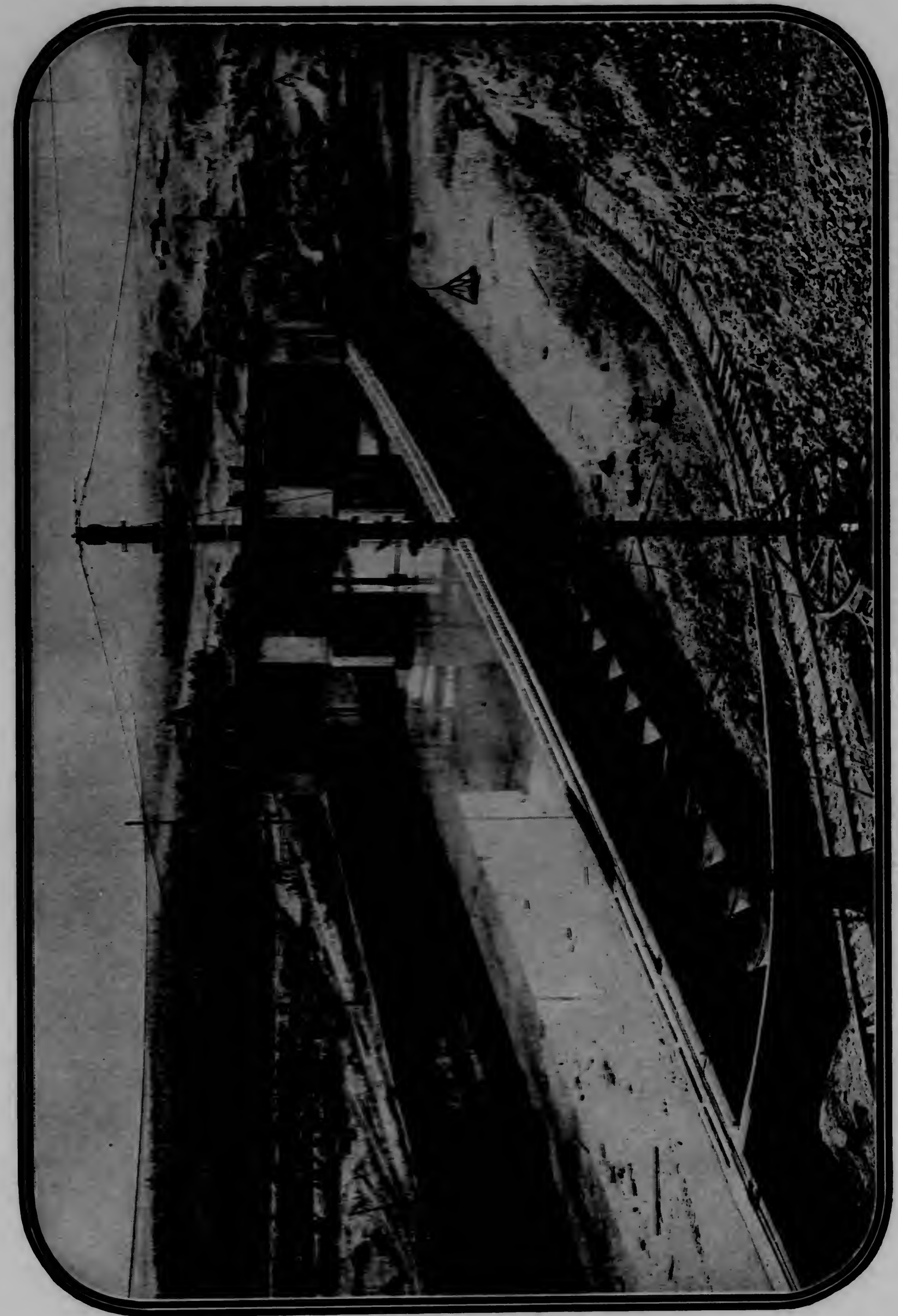
Egyptian cotton is raised in but three places in this country, Yuma, Imperial and Salt River valleys. Every year we import \$16,000,000 worth of this product, while 100,000 acres of such land as is embraced in the Yuma project easily could supply the

looms of our country. Yuma oranges and grape fruit are the first on the market, and are deliciously sweet. Vegetables and cantaloupes are ready for the consumer from two to three weeks before those of any other section.

Just west of the town of Yuma, in the alluvial flood plain of the Colorado, lies a little farm of about seven acres, which on May 1, 1905, was virgin bottom land covered with saltweed, arrowbrush and creosote bushes. The original purpose of the tract was for planting selected varieties of date palms imported by the Department of Agriculture from the Old World. Recognizing the fact that a farmer with his living to make cannot afford to wait for an orchard to come into bearing, it was planned to plant crops for quick returns between the tree rows, thus putting the work on a feasible basis from the small farmer's point of view. While the operations on this "play farm" have been purely experimental, the results have been most gratifying, the net cash returns running from \$27 to \$561.45 per acre. It is planned to extend the area of this farm, and to make it a valuable free school for those settlers who come from humid regions and are not familiar with irrigation.

To the romancer this section furnishes many a worthy inspiration. There is a flavor of antiquity about the crumbling adobe houses of the pioneers, and the tepees of the Indians, becoming fewer in number each year, speak eloquently of the dying race. One of the old overland trails made by the '49ers in their mad rush for the new El Dorado passes near Yuma, and all up and down the banks of the river near the dam the ruined shacks of the miners may still be seen. An old gold dredge located on the California side of the river was blown up with dynamite by the engineers to make room for the sluiceway at the end of the dam. This dredge cost its owners \$100,000 to install, but it did not prove a paying venture on account of the crude methods then in vogue.

The miners of those turbulent days did not get all the gold that Nature had hidden in that vicinity, however, for frequently, when for some reason a man is relieved from duty at the dam, he will procure a small outfit, hie him to the hills, and loosening some of the soil carry it to the river where he can sometimes pan out from 75 cents to \$1.50 per day, or, if he has exceptionally good luck, he may get even more. The famous North Star



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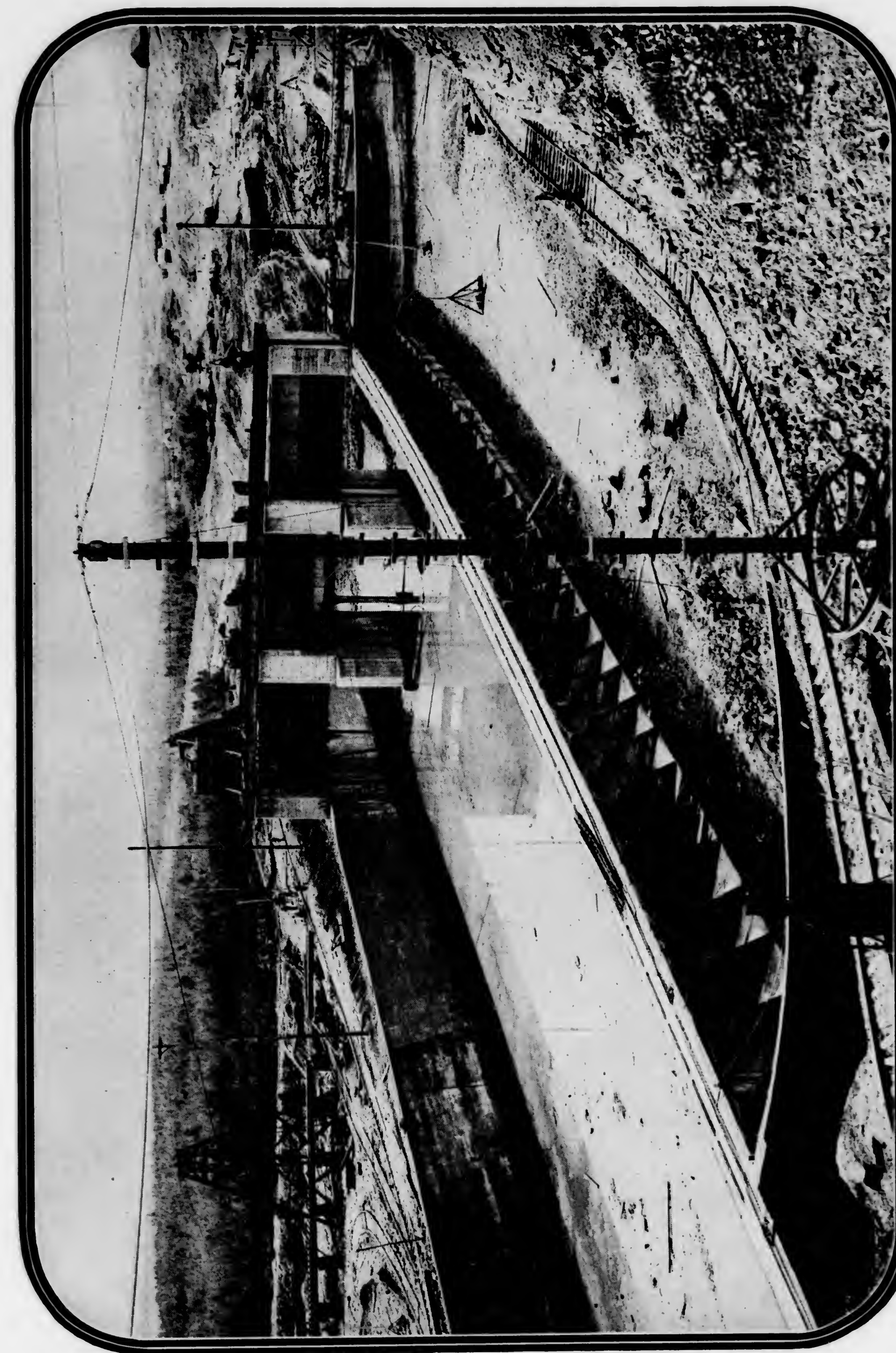
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Retake of Preceding Frame

mine, located twenty-five miles north of Laguna dam, promises to be one of the greatest gold producers the world has ever known, at least so the prospectus says. It is a well-known fact that the old Fortuna mine not far from Yuma yielded millions of dollars worth of ore in days gone by.

If one has time he may glean strange scraps of desert myth and lore, for there are many desert derelicts—Indians, Mexicans, prospectors—who drift about as the cactus fruit ripens, or tales get abroad of rocks flecked with "values." There have been strange characters, too, at work on the big dam. Six hundred men, Mexicans, Indians and hoboes were employed there. The Indians are usually peaceable if unmolested, for no liquor is allowed on the premises. As the little train, which travels back and forth between Yuma and the dam, leaves Yuma, the Indian inspector rigidly investigates all suspicious looking baggage, and he even goes through pockets if the case seems to warrant it.

There is very little lawlessness, for the Arizona ranger who is stationed at the camp is a crack shot and is looked up to with a great deal of respect. It is said that the lower classes of Mexicans south of the border believe that Mexico would make short work of the United States were it not for the presence of the rangers. The organization consists of bodies of men in Texas, New Mexico, Arizona and California, who were originally appointed for the protection of the border against outlaws and Indians, and although the day of the scalp lifter and bad man has practically passed it is deemed wise to still patrol the wide expanses of desert and to keep an eye on the mountain fastnesses.

The constructing engineer states that contrary to the usually accepted idea, the Indians are good workers, two of the best mechanics at the dam being full-blood Yumas. Mohave-Apaches, Navajos, Cocopas, and Papagos are also employed. The Apaches are the best workers, but they are not by nature as peaceable as some of the other tribes.

The Yuma Indians were a very strong tribe before the early '50s. At the time of the rush to the California gold fields these Indians, Cuchans they called themselves, were very friendly to the white man. They established a little ferry service across the Colorado for which they collected small amounts of money. But at last a party of shrewd men, seeing a chance to establish a remunerative business for themselves, forbade

the Indians to do any more ferrying. The Indians simply moved a little farther up the river, but the next time they attempted to ferry white men across the river two or three of their number were shot. There followed an uprising of the Cuchans which ended in the arrival of the United States troops and the virtual extinction of the tribe. Under the leadership of a wise chief, however, they afterwards regained some strength, but they have since that time devoted themselves to pacific pursuits.

Missionaries have been among these Indians but seem to have little influence. The Cuchan believes in Co-co-maht, the Great Spirit, who dwells in a mythical mountain not far from Yuma, the center of the universe. Ages ago Co-co-maht's son came down the Colorado and met with an accident which ended in his death. Co-co-maht built a large funeral pyre in the desert and cremated the remains. The Indians believe this to have been an object lesson and that any Yuma who dies must be cremated if he is to pass to the happy hunting grounds. The funeral services are jealously guarded from the eyes of the white invader. When the dead are burned all their belongings, including their houses, are burned with them.

Like all other Indians the Yumas are spiritualists. At the time of certain stellar conjunctions the feast of the dead is held, lasting three days and three nights. During this time the Indians do not eat and the spirits of the departed are supposed to come and commune with them. The families sit around the field conversing with their dead while the chief medicine men are gathered in the center of the inclosure invoking the departed spirits. At all other times they are strictly forbidden to name any dead member of the tribe above a whisper, for fear of disturbing the spirits in the realms of Co-co-maht. During the day white men are occasionally allowed to be present, but all strangers are warned in no uncertain terms to keep away at night. As darkness draws on watch fires are built in the inclosure, with an altar in the middle which is at last burned at 4 o'clock in the morning. Every member of the tribe brings some trinket or valued possession and throws it in the flames for the use of his dead friends and relatives. The reservation is situated just across the river from Yuma.

Yuma enjoys the distinction of being the only town within the limits of the project at present, but it is more than likely that as the

lands are settled up there will be the need of several small villages at various points. Geographically, as well as commercially, however, Yuma is the hub of the system. Situated only a short distance above the Mexican line, at a point on the Colorado river where boats could easily reach it from the Gulf of Mexico, it was for years the distributing point whence supplies were furnished to soldiers, frontiersmen, miners and cowboys. The mining supplies and outfits were packed away on the backs of burros, but now the Southern Pacific railroad, which crosses the river at this point, brings in thousands of tons of heavy machinery. As the farm lands settle up, these shipments will be supplemented by carloads of implements, merchandise, and all the necessities of life as well as many of its luxuries.

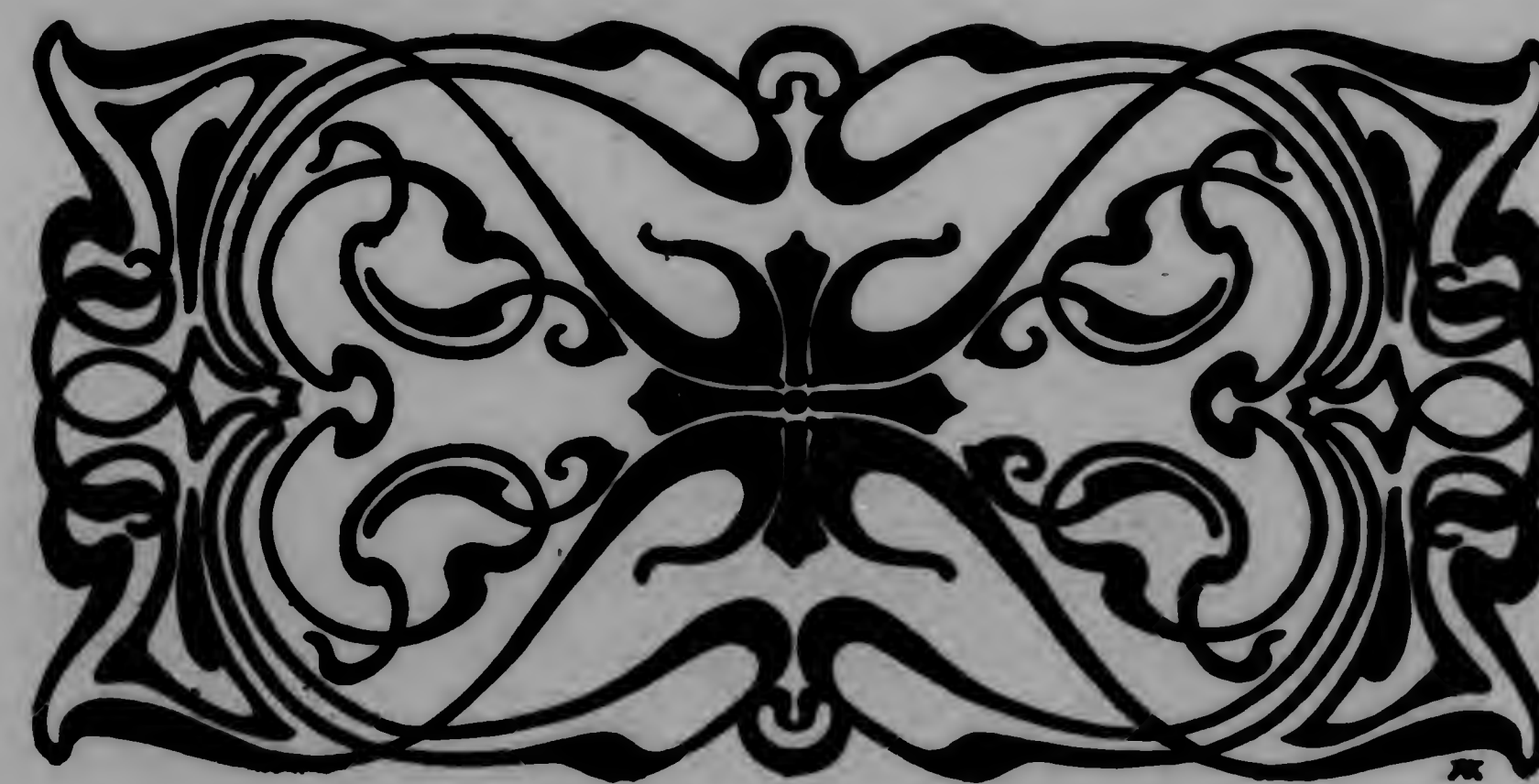
The heat of Yuma is proverbial, due probably to the excellent opportunity the tale affords to get off stories similar to the one about the man who died and forgot his overcoat, but the fact is that the sensible temperature is very little higher than at Washington, where the percentage of humidity is so much greater. Visit any of the camps and homes which are scattered over the project and you will hear no complaints about heat. The men work out of doors all day and sleep in the open all night. There is no record of any case of sunstroke in the valley.

There is no doubt that the climate is very healthful, and the semi-tropical heat, together with the lack of rainfall, makes the problem of cheap architecture a very simple one. Indeed the Mexicans and Indians have solved

this very satisfactorily for an outlay of about one dollar and a little manual labor. Four to six poles of cottonwood, sides and top of willows, and their home is established.

With the plentiful supply of water which is assured and the advent of shade trees to soften the dead white glare of the sun on the sands, the heat will be less noticeable. A great many cottonwood trees are being planted, as they grow very rapidly, but the prime favorite is the eucalyptus. Recent experiments in the growing of this tree are very interesting. Some of the bottom lands under the Yuma project are heavy alkali soil. The eucalyptus thrives on this land, and it is believed that it eventually will reclaim it, in the meantime producing a valuable growth of timber. It is believed that enough eucalyptus could be raised in Yuma valley to supply the cabinet workers of the country forever, using for the purpose land which is now heavy alkali soil.

It is easy to believe in the future of this project when you hear the note of optimism that rings in every statement of the men who are engaged on the final details. Every employé is an enthusiast, taking a personal pride in every detail of the work. Up at Laguna dam the constructing engineer has toiled from sun up to sun down, and often well into the night, watching every move in the building of the great structure, and down at the headquarters camp at Yuma it is said that the project engineer lies awake o' nights to enjoy the musical clink of the big scoop wheel which is already deluging several thousand acres of land with such volumes of life-giving water as the farmers never dreamed of before.



FROM WEST TO EAST

A RIDING SONG

By WALTER ADOLF ROBERTS

DRAWINGS BY SIDNEY ARMER



Into the ultimate East,
Into the arms of the day,
I have flung myself with a wild halloo!
Drenched with the cold, clean morning dew,
And drunk with the scent of May.

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Retake of Preceding Frame

Florida

Seminole Indian Names

By Robert Billy, = Hota let Ya hole
Near Everglades, Florida
May 23, 1938

Vernon Bailey.

Deer - Etsi

Bear - Nopáse

Wolf - Oba'ho'se

Gray Fox - Chó'lee

Panther - Poa tso'be

Bobcat - Coó'se

Raccoon - Saw ee'

Otter - O sanie

Mink - Shin'kas o'lee

Weasel - Co nee'

Opossum - Sho kee hap'ke

Marsh rabbit - Chok'i' fee

Cotton Rat - See see'

Manatee - Po sha fe'

Alligator - Hal pu tae'
 Snapping turtle - Look tse la cóe
 Rattlesnake - Tsin che cho be
 Water moccasin - Ope tsin' tee
 Copperhead - Tsin pa ta' te
 Catfish - Cats cá che
 Gar fish - Tso tsa' he
 Mullet - Tae ah a weí
 Jackfish - Sha se só e

Pine tree - Tso' yea
 Bald cypress - Ase weí
~~Pond cypress -~~
 Banyan tree - I alo' che
 Cabbage palm - Pal chóbe
 Royal palm - His ku yhe'
 Palmetto - Che ah pe

{ Seminole from near Everglades, Florida
 collected by Vernon Bailey
 May 23, 1938

Sun - Ha she

Moon - ~~Ha sotade~~ (Hasotade)

Stars - Oat se ke

Earth - Oshote

Fire - Lopatke

Water - Oke

Rain - Obatse

Wind - Poplitse

People - Yáte

Seminoles - Yatkitá'se

Man - Nakane

Woman - Dakamotse

Girl - Dakotse

Boy - Nakamoche

Baby - Yatse

Seminole from near Everglade Florida -
 got by Vernon Bailey, May 23, 1938.

Numerals of Semivoles

1. Klancee
2. Toquellan
3. Bitseva
4. Setan
5. Tsacatan
6. Epila
7. Colipae
8. Toshenopila
9. Ochtopate
10. Pokoda
11. Pokoda klawagan
12. " Tolaga

May 23, 1938
near Everglade, Florida

[They count to 100]

Vernon Bailey

Great Plains

1910-18

Wissler - Plains Indians

1913

May 1913

THE NORTH AMERICAN INDIANS OF THE PLAINS

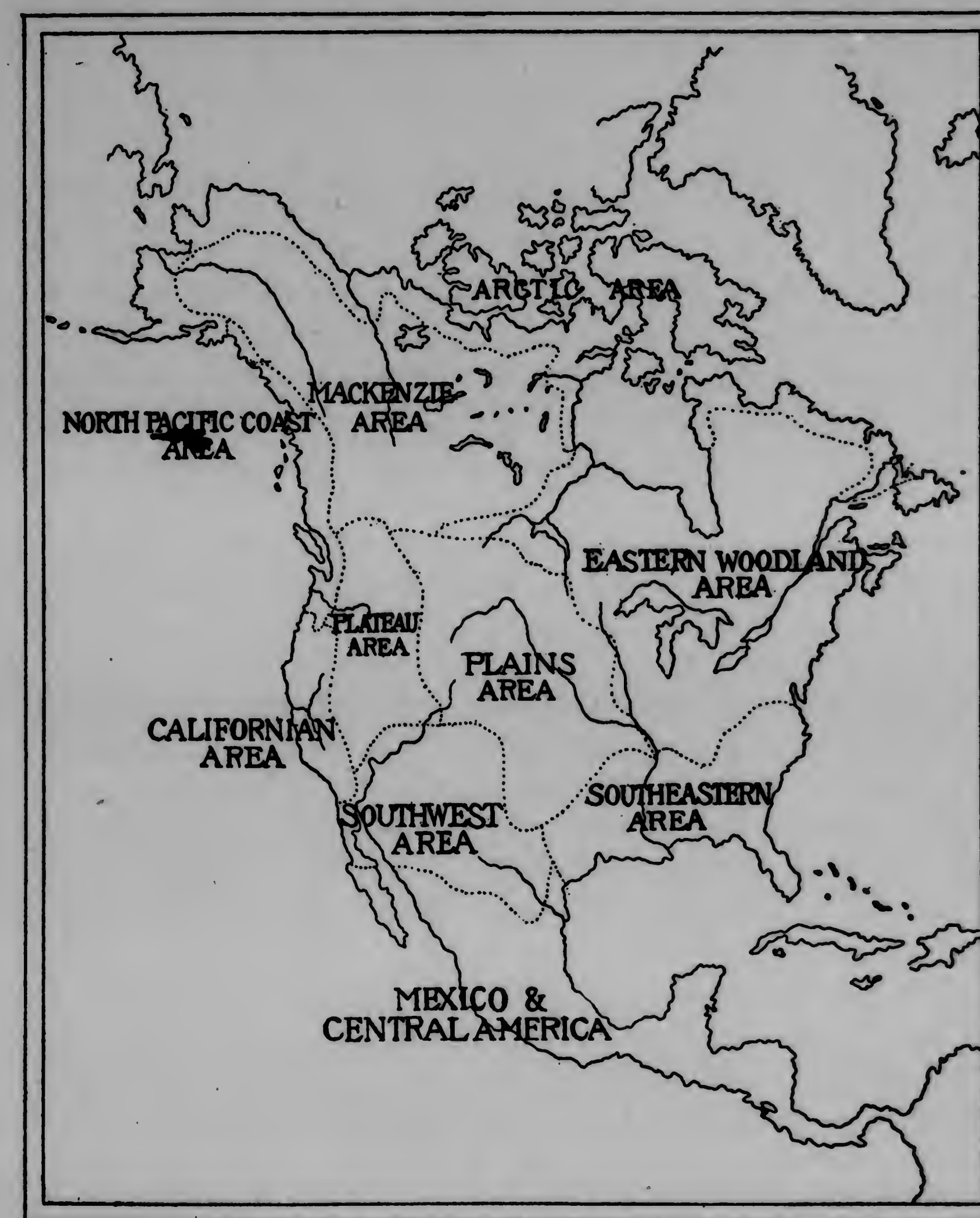
BY DR. CLARK WISSLER

THE AMERICAN MUSEUM OF NATURAL HISTORY

ANTHROPOLOGY is one of the newer sciences. Its development during the past ten years makes clear that regardless of the original meaning of the term anthropology, and, in spite of any one's opinion on the subject, it is primarily a culture study. Culture is here used in a technical sense to designate the complex of social and intellectual activities constituting the life of a native tribe or a group of people. One of the most engaging problems of our time is the origin and mode of development of this culture, which is, after all, the distinctly human character that differentiates man from the animals. Modern anthropology has made this its chief problem and has thus set itself over in contrast to biology which concerns itself with man only in so far as he has animal characters. The theory of evolution was devised as a working scheme for the study of animal characters and has therefore little direct bearing upon anthropological problems, notwithstanding the fact that formerly many anthropologists tried to make it their method also. When it became clear to all that the study of man must concern itself with the distinctly human characters, and delegate his distinctly biological problems to biologists, anthropologists began to formulate their cultural conceptions, which is now their working scheme in just the same way that evolution is the method of biologists. Unfortunately, the culture problem appears peculiarly difficult and complex and has, like evolution, become the battle ground for several incompatible theories of origin and growth. Yet, in the course of its labors anthropology has accumulated an unusually large collection of data and has so systematized its results that whole continents may now be divided into culture areas. For some of these areas our information is now so complete that one may form some idea of what went on within their borders in definite periods of time. The anthropological method in such cases is decidedly empirical, for everywhere interpretations are regarded as permissible by historical analysis only.

As an illustration of what has already been accomplished in anthropology, we may attempt a brief résumé of the Plains Indian culture in North America. In North America, as a whole, anthropologists usually recognize from ten to eleven more or less clearly defined culture areas, the approximate borders of which are indicated on the accompanying map. Yet, in most cases these divisions are not absolute, but relative, for rarely can a group of Indians be found anywhere,

however small, that does not show some of the cultural traits of all its immediate neighbors. One of the most striking characteristics of culture distribution is the constant intergradation of traits, so that only in exceptional instances can the cultures of even two neighboring groups be considered exactly alike. Nevertheless, certain groups often possess in common highly characteristic traits, whence they are said to be of the same general types. The divisions on the accompanying map mark off the limits within which the respective sets of characteristic traits seem



CULTURE AREAS IN NORTH AMERICA.

to predominate. Thus, the various tribes of Plains Indians have a number of peculiar traits whose distribution in more or less complete association is taken as indicating the geographical extent of a type of culture.

One of the most conspicuous marks of Plains culture is the relation of the Indian to the buffalo. Though the buffalo, or bison, was at one time widely distributed in the Mississippi Valley, it seems to have been chiefly at home in the treeless areas of the west. After 1800, at least, the large herds were found in the great open stretches of country, east of the Rocky Mountains, or the long narrow white area in our forestry map. While this was the region in which the herds were thickest and typical, there was also a fringe on all sides, but especially to the east, of small random groups of buffalo. We thus see a faunistic distribution making it possible for Indians in the heart of the area to live entirely on the buffalo, while their neighbors could to varying degrees derive partial support from the same source. This is about what observation shows to have been the case.

From the time of exploration to 1860, or later, all the tribes of Indians living within the great treeless area east of the mountains made the hunting of the buffalo their chief occupation. They cultivated nothing and used only a few wild fruits and roots to supplement their almost exclusive meat diet. Reference to the forestry map will show how the wooded area fringes out into the Plains. Now, the Indians living in this fringed area also hunted buffalo, but not exclusively, for they raised maize, beans and squashes. Again, on the west in the open country between the mountain ranges, the tribes occasionally hunted buffalo; but, though they did not practise agriculture, they gathered great quantities of wild grass seeds which when ground and baked formed a considerable part of their diet.

Thus we see that by taking the use of the buffalo as an index of culture we may roughly group the Indians of the Plains under three heads: the typical or primary tribes, the eastern or semi-agricultural tribes and the western or plateau tribes. If we seek further to characterize the culture of the typical group we find the following conspicuous traits: the use of the tipi all the year round; in historic times, the use of the horse; in earlier times the use of the dog for transportation by travois; an organized camp circle and police system for the regulation of the buffalo hunt; a religious ceremony known as the sun dance, and a highly individualized decorative art. Waiving several minor traits, we may take these as determining characters in the typical Plains Indian culture.

On the tribal map we have used an asterisk (*) to distinguish those clearly manifesting these traits. As previously stated, we must not expect every tribe in this group to manifest every typical trait, for here as elsewhere the gradation of culture is in evidence. Further, the tribes differ as to the degree to which they assimilate cultural elements. For example, the Comanche had no sun dance and a rather weakly organized camp, but otherwise had the typical traits. The Teton-Dakota, on

the other hand, seems to have all the before-mentioned traits in full function and for that reason the most typical, whereas the Comanche seem to stand at the other extreme.

Turning now to the eastern group, we find all of them cultivating maize and in most cases using a more permanent bark, mat, or earth-



THE INDIANS OF THE PLAINS.

The ranges for the various tribes are approximately indicated by the positions and extents of their respective names. As a rule, these tribes did not respect definite boundaries to their ranges, each tribe claiming certain camping places, but otherwise hunting and roaming where it pleased. The typical Plains tribes are designated by a star and range north and south across the area. To the east of them are the tribes practising some agriculture, perhaps in imitation of the Woodland tribes. On the west are a few tribes whose position is quite uncertain; hence the boundary for the culture area has been drawn through their range, thus giving them an intermediate position.

covered house. The most curious thing is that in this area this type of house seems to be associated with agriculture, because the houses are usually placed near the fields and occupied only during the planting season. In many cases, when not engaged with their fields, the whole tribe would take to tipis or other temporary shelters and roam about hunting buffalo. Even in midwinter, the Omaha and Santee-Dakota

left their earth and bark-covered houses to dwell in tipis. When out after buffalo many of these tribes used a camp and police organization similar to that of the typical Plains group. Other traits, such as the sun dance and sign language, occur but occasionally. The members of the typical group were neither potters nor weavers, but in the eastern group we find some weaving and some pottery, though not so highly developed as in the far east and south. Our eastern Plains group thus stands as an intermediate or transitional culture, between that of the typical buffalo-hunting Indian of the west and the typical sedentary Indian of the Ohio Valley.

In the same way we could show that the tribes to the immediate west are transitional between Plateau and Plains culture, because they have traits common to both.

So far, we have considered culture alone. Anthropologists usually classify people in three ways: language, culture and anatomical characters. Strictly speaking, language should be included in culture, but because of the peculiar difficulties in linguistic research it is more convenient to separate the two. The tribes enumerated in the map speak languages belonging to seven distinct families (Sionan, Algonkin, Caddoan, Kiowan, Shoshonean, Athapascan and Shahaptian) and have more than twenty separate languages. Six of these seven families are found in other culture areas and in some cases widely distributed over the continent. As is well known, there is no apparent correlation between cultures and language, for should we superimpose linguistic and culture area maps there would be no significant correspondence. The same may be said of anatomical type.

We may now consider some of the important problems raised respecting the culture of the Plains Indians. Everybody interested wants to know how and when their culture developed, but all problems of this kind have proved particularly difficult, so that no one can yet say even approximately by what means cultures came about. On the other hand, we have sufficient data from some culture areas of the world to form some idea as to what went on therein within a given period of time.

Several more or less extreme theories have been proposed to account for culture. One is that, in the main, each group of people, independent of every other, worked out and created its own culture. The opposite view is that independent invention is extremely rare, so rare that we may assume all like traits as due to inter-tribal borrowing, or historical contact, until we find evidence to the contrary. The present tendency among American anthropologists is to take the middle ground and stand for empirical methods in that both may be true to a degree and that each culture is to be considered upon its own merits without regard to an initial assumption. To them it seems unnecessary to assume anything as to origin until there is real evidence lending itself to a particu-

lar interpretation. It is conceivable that a tribe may build up its culture by some independent inventions and by some borrowing from its neighbors, all of which may perhaps be revealed by the careful analysis of neighboring cultures and a comparative study of their traits. If we



THE DISTRIBUTION OF FORESTS IN WESTERN UNITED STATES.

The shaded portions of this map mark the areas originally covered with trees. The true plains extend from north to south along the eastern border of the Rocky Mountains. On the west, trees are found on the sides of mountains; on the east, they stretch out into the plains along the margins of the streams. Reference to the tribal map shows how the typical group ranges in the open plains while the eastern agricultural village group lives in the partially forested belt. On the west the plateau group appears to range in the open stretches among the mountains.

apply this method to the Plains we find an easy line of approach. Some years ago, Mr. Mooney published his objective study of the ghost dance religion, a curious religious movement originating in one tribe and

quickly spreading to several tribes of Plains Indians. In this case, there can not be the least doubt as the events are a matter of history. Again, at the present day the mescal ceremonies are working their way up from the south among the Plains tribes; this is also a matter of history. In addition to these absolute examples of cultural borrowing, we have cases like the grass dance ceremony, now found in all parts of the area. We have the testimony of several tribes to the effect that this ceremony first originated with the Pawnee. The Teton-Dakota claim to have obtained it directly from the Pawnee about 1870; the Arapaho and Gros Ventre claim to have borrowed it from the Dakota; the Gros Ventre claim to have taught it to the Blackfoot about 1883. While these statements of the Indians need not be taken as absolutely correct, their significance can not be ignored. There are still other traits like the sun dance which are found in the same essential forms among many tribes of the area, but concerning which the Indians have no definite historical knowledge. In this class also must be placed the more objective traits, like tipis and decorative designs. Now, since we have direct historic evidence of borrowing in some cases, the testimony of Indians in others, and still others in which we see all the secondary signs of borrowing, it must be admitted that a strong case has been made for the spread of culture by inter-tribal borrowing.

While borrowing will thus account for the distribution of traits, it can not answer the question as to their origin. For each trait we have a separate problem, since to be borrowed it must have been invented somewhere first. To solve this problem actual historical data are needed, something that is in most cases unattainable, but on the other hand, certain conclusions seem justifiable.

We note that many of the more material traits are peculiarly adapted to the bison-hunting life and to the habits of a semi-nomadic people. This seems reasonable, because many of them are rarely found outside of the Plains area. If this is granted, it seems proper to conclude that they must have been invented by some of the Plains group.

Another related problem is that of migration or origin. For the Cheyenne we have some historical data, the import of which seems to be that they migrated from the Woodlands to the Plains about two centuries ago, where they must have changed in culture very rapidly to become one of the typical tribes, as they were found to be in later years. It is also quite clear that the Sarsi, Plains-Cree and Plains-Ojibway came out of the northern and eastern forests into the Plains something more than two hundred years ago. As to other tribes, we have no data. There is ground for an assumption, however, in linguistic relationships. Some people say it will not do, for example, to say that the Algonkin tribes in the Plains migrated thither on the ground that the greater part of the stock lived in the Woodlands, for it is conceivable that the reverse may

have been true. On the other hand, since the most widely distributed stocks (Algonkin, Athapascan and Shoshone) have minor representation in the area, it seems unlikely that the Plains should have been the cradle land for all. The difficulty is to find proof for any one stock. Nevertheless, it seems reasonable to assume that some of the tribes came there by migration, bringing with them cultures of another sort, as did the Cheyenne and Plains-Cree in historical times. We should then have a period during which various cultural groups were introducing and adapting themselves to new conditions. The most reasonable theory, for the origin of Plains culture, therefore, is that it was the joint product of many tribes, some working out one trait, others again different traits, which by tribal contact and interaction were gradually diffused over the area. In other words, the culture as a complex was worked out by the Plains Indians themselves, but probably not by any one group and probably not without very material aid from tribes in other culture areas.

In some of the older literature we find the belief that there is a more or less steady upward trend in the affairs of man and that there comes a time in the careers of all peoples when they change from a nomadic to a sedentary agricultural life. While as a general principle it is clear that there must have been a time when agricultural groups changed their less sedentary life, it would not be correct to infer that the Plains Indians were always nomadic. Mr. Mooney has made a good case for the Cheyenne as formerly living in the fringed area to the east where they raised maize, but later moving out into the Plains and becoming one of the strikingly typical hunting tribes. In this case the change was radical. It is sometimes regarded as fair to assume that the Arapaho went through the same transitions, but there are no positive data. On the other hand, the Dakota may have followed the reverse process, though we can not be positive, for some of the early Jesuit writers say that in their day none of the Dakota were given to agriculture, while later observers found the eastern division, or Santee-Dakota, raising maize, beans and squashes. The tendency has been to assume that all the Dakota were once agricultural and that the Teton division abandoned the practise when moving west of the Missouri River. The chief objection to this view is that in some of the earlier literature we find evidence that the Teton themselves had no traditions of ever having practised the art. This taken with the positive statements of the Jesuits makes a good case. Further, we find that the tipi was used by all the Dakota as their chief dwelling and was by them so regarded, in spite of the fact that when tending their fields the Santee division resided in bark-covered cabins. This tendency to make the tipi the primary dwelling was quite widely distributed in the area and suggests that agriculture may have been but recently introduced to some of the buffalo-hunt-

ing tribes living along the fringe to the eastern forested area. We have then rather good evidence that cultural transitions went on in both directions within the Plains area. On one side were the typical non-agricultural tribes in the midst of buffalo, on the other were the forest tribes living in fertile valleys amid the trees with their small fields of maize; between them along the Mississippi, the lower Missouri, the Illinois, etc., were interspersed prairies and woodlands. Naturally, the people in this middle ground might take to alternating in buffalo hunting and planting, finally some going over entirely to the one or the other. Thus we had, no doubt for many decades, a shifting of culture influences, now in one direction, now in the other, and while we have here no evidence of a fixed direction of development we do have what may be taken as a typical example of how a people develop culture. In general, we believe that the facts warrant the assumption that the typical Plains culture was developed in the heart of the area and was the composite result of independent invention and the adaptation of intrusive cultural traits from the east, south and west.

due to the land grant act, to furnish this higher education, for the equipment of which they are liberally supported by the state and national means. The claims upon the preparation for entering these colleges are also about the same as that required by schools of the higher order, or the university class, that is high-school graduation, or its equivalent. But in spite of these advantages and the numerous special courses offered by nearly all these colleges, a great many of our graduates are suffering from the deficiencies complained of by Professor Vesque, thirty years ago in France.

In glancing over the catalogues of the courses of the agricultural instruction given in these colleges, one is struck by the multitude of optional courses, which are frequently restricted to very narrow specialties. The time allotted to one of these petty subjects is frequently as much as that given to the whole of the science of botany, which constitutes one of the main foundations of the entire structure of higher agricultural education.

In further examining these special courses, we shall find that many of them presuppose a careful preparation in botany which, however, has not been granted by the general curriculum. It is not infrequent that a student in some of these colleges is receiving lectures in plant breeding without previously having received any instruction, worth his while, either in morphology or taxonomy. An examination of the curriculum of many of our agricultural colleges seems to reveal the fact that there is too much specializing upon the superstructure before a safe foundation is laid. If the student be equipped with a fair general knowledge of botany, chemistry and physics, including physical chemistry, he may be trusted to develop the specialties of agriculture resting upon these as opportunity and occasions arise, but if the fundamentals be lacking, he will always remain uncertain and giddy.

H. NESS

TEXAS EXPERIMENTAL STATION

PROFESSIONAL COURTESY

TO THE EDITOR OF SCIENCE: We appreciate your courtesy in submitting to us the criti-

cism concerning ethics involved in the publication of the article referred to by Professor Hart. We do not feel that a reply to the charges contained in his statement is necessary, further than to say that the work referred to was planned entirely by one of us (McCollum) and was carried out by Mr. Steenbock, according to the usual practise in experimental work. The detailed records of the time of extractions, filtrations, evaporations, etc., were published verbatim from notes copied by Mr. Steenbock for me as requested, and should, of course, correspond closely with his notebooks.

In a case of this kind where the veracity of one of the statements must be questioned by those who read this charge and our reply, nothing better can be done than to leave the public to judge for itself on the basis of the research records of all concerned as to the probable responsibility for the planning of this work.

E. V. MCCOLLUM,
N. SIMMONDS

SCIENTIFIC BOOKS

Societies of the Plains Indians. Anthropological Papers of the American Museum of Natural History. Volume XI. New York, 1916. Edited by CLARK WISSLER. Issued in 13 parts; C. WISSLER, R. H. LOWIE, P. E. GODDARD, A. SKINNER, J. R. MURIE, contributors.

This volume probably does not represent the greatest undertaking in modern American ethnology: it does represent one of the most efficiently executed, and is therefore of interest as an example of the method to which the science has attained. In case the designation "science" seem as yet unearned, let us compromise on "study of uncivilized culture history."

There are still many students at the height of their activity who were trained in, and some who practise, the older ethnology: a discipline begot by an intrinsic interest in the phenomena of culture, but fathered and nourished by the doctrine of evolution after it had begun to transcend its proper biological

source; and leaning as heavily as unconsciously on a kind of crude lay psychology of the individual. So strong was the impress of the idea of an unfolding sequence inhering in phenomena themselves, in this earlier ethnology or self-styled "science of man," that the actual relations of its phenomena in time and space were rarely looked into systematically. In consequence, its causal factors were determined with equal randomness. The explanations of causality of which the evolutionary anthropology of a generation ago consisted, were hypothetical and plausible.

The element of time, easily recoverable, at least as regards its relative phases, in prehistory and most fields of archeology, can be only indirectly reached in ethnology proper, which deals with living peoples innocent of writing. Ordinarily, all that we have of them is a momentary cross section of the long stream of their customs. Obviously, the course of this channel can be reconstructed factively only through a detailed determination of the data in terms of some other element which may subsequently be converted into factors of time. This other element is that of space; or, as it is usually named in this connection, geography. Experience to date has revealed no other method, except the speculation, mystical or rationalizing, concealed or avowed, of the older workers.

The spatial factors were strongly appreciated by Ratzel and his school, though still partly in terms of formal physical geography. Chance, however, brought it that in this country a body of students less driven through their general social environment to attempt interpretation than their European colleagues, found themselves envisaged at arms' length, as it were, by a mass of first-hand and living ethnological data. Once these were tasted, they proved emotionally palatable to many minds; with the result that materials were gradually accumulated on a really enormous and unprecedented scale.

It is curious how slowly the realization of this opportunity dawned. Ethnology was practised in this country fifty and seventy-five years ago, and if the students were less in

number, they were, man for man, probably more illustrious, as the names of Hale, Gallatin, Morgan, Brinton, and Powell attest. These eminent men truly conducted researches, where many a successor has done little more than assemble material. But the personal contact of all of these pioneers with the Indians at their door was limited, and several disdained it wholly. The explorer, the traveler, the missionary, the military leader, sometimes the compiling historian or instituting official of civilization, were their purveyors of substance. Only slowly was it felt that as good and far better information could be got by the inquirer whose business was ethnic knowledge than by the voyager or resident whose purpose was incidental, and that such acquisition, instead of being an arduous preliminary task, was in itself a grateful pleasure. Much of the old native life long resisted the brunt of our civilization; an infinitude more lay immediately below the surface. The Indian, far from impeding serious inquiry, in most cases was only interested in facilitating it. An enormous tribal diversity lent the color of variety to every increasing endeavor. And, as the spread of the frontier and the education of the Indian tended to obliterate the continuance of native custom, they also rendered access to the people, and intelligent communication with them, easier, less expensive, and more profitable. To-day, the generation of American ethnologists is reared in field studies. Its novices take work on an Indian reservation for granted as the first step on the professional ladder. It is true that acquisition for a time so far outstripped utilization that the reproach was sometimes leveled from transatlantic quarters that purpose had been forgotten and direction lost. But it is equally important to realize that no equally extensive and continuous body of detailed ethnic data has ever been accumulated on the primitive people of any other area as on those of the United States, Canada, and Alaska.

In time, the mere mass of material forced its classification; and its arrangement by types

proved to be essentially an arrangement in space also, in practically every instance. The factor of distribution became as inescapable as in biology, and was recognized as far more momentous than had hitherto been the case in the depiction of non-literary peoples. From distributions to diffusions was only a step that forced itself on the attention; in technical language, the "culture area" began to be replaced by the "culture center" as a working tool. And any diffusion already sets us in time as well as space; with the results that ethnology is beginning to be back at the sequences with which it commenced—but now painstakingly arrived at and laboriously solidified instead of speculatively leaped at.

An example is the present volume on "Societies of the Plains Indians." The older ethnologist vaulted the gap between a tribe in Mexico and one in Alaska, or slipped between the beginning and end of a sentence from ancient Greece to modern Australia as if his bridge of fancy were one of traveled fact; and his next colleague—there were no collaborators—rambled or flew where he listed. The student of to-day begins by associating himself with colleagues. They plan an inquiry, not into a universal phase of human activity, nor of the American Indian, but of the formal religious associations of one group only of North Americans, the closely similar tribes of the Plains. They are nine years securing their material and four presenting and analyzing it; and it bulks to a thousand pages. This may seem a rioting welter of technicality. The laymen would prefer a handy pocket volume that told him incisively who the Indian was, whence and how he came, the consistent scheme of his society, the nature of his religion, and how both originated. There is no answer, nor attempt to answer, even one of these quesetions in the present work. Its thirteen parts describe the associational organization of the religion of sixteen tribes, or, with those on which adequate information happened previously to be extant, all of any importance within the cultural limits of the Plains. The type of each tribal religion is defined; interrelations elucidated; and the

two concluding comparative sections by Drs. Wissler and Lowie finally settle into pure history in the most rigid sense of the term.

Thus, in his "General Discussion of Shamanistic and Dancing Societies," Dr. Wissler gives a family tree of the Iruska ceremony and associations connected with it. He succeeds in tracing this to a Dakota rite known as the Heyoka, which, with the addition of certain Omaha features, was taken by the Pawnee and worked into the Iruska proper. This traveled back to the Omaha and from them to the Dakota, who, by adding a new and vigorous series of songs, popularized the ceremony as the Grass Dance, and gave it to a long array of tribes. One of these, the Potawotomi, some twenty years later, added still farther to the religious "complex," and, as the Dream Dance, passed it on to another group of tribes. These were marginal or exterior to the Plains, distinct in their religious assumptions from the Plains tribes proper, and obviously took up the made over form of the ceremony because it was made over. A number of peoples accepted the "Iruska Trait-Complex," as the author calls it, twice in their and its careers; the Iowa even received and followed it three times, as Iruska proper, Grass Dance, and Dream Dance. It is of interest that as a rule the natives were well aware of the filial relationship between an earlier and later form of the cult.

It is clear that what we have here is history as historical as any following out of the origins and growth of Christianity or the Papacy or Parliamentary government, but reconstructed by circumstantial evidence derived from materials furnished by a group of peoples without annals, documents, or a scrap of writing. It is also evident, while the world will never be deeply moved by the Iruska cult or by the activities of the Pawnee in the nineteenth century, that studies such as this are uncovering principles of broad applicability—principles of a psychology that is truly social, and that in a greater or less degree must ultimately be met and recognized by every historian or analyst of human civilization.

Similarly, Dr. Lowie in his comparative study of the Age Societies—religious bodies grouped or graded according to the age of their members—although dealing with a set of institutions much older than the Iruska ceremonies, in fact far antedating the advent of the Caucasian in the region, establishes that the age-grade societies are an outgrowth of a system of non-graded societies still prevailing among the majority of Plains tribes; that the grading originated among either the Mandan or Hidatsa; and that the scheme spread from them respectively to the Arapaho and Gros Ventre and to the Blackfoot at a time when these peoples were in closer contact with the Mandan-Hidatsa than has been the case within the historic period. Again, the outcome of the investigation is a specifically founded reconstruction and a definite tracing of the sequence of events.

Dr. Lowie concludes by testing against these positive determinations a theory devised according to the old method by Schurtz, purporting to discern age societies as an institution arising spontaneously and necessarily at a certain stage of development of human civilization. As a wholly abstract speculation, the Schurtz hypothesis is scarcely assailable and equally useless. Matched against the analyzed facts in the Plains of North America, in Melanesia, and in East Africa, it breaks down and dissolves utterly. In fact Dr. Lowie shows convincingly that the age societies in these regions are not identical nor even parallel but represent diverse causes, diverse characters, and diverse sequences. Their uniformity and the supposed "laws" governing them are in the assumptions of the theorizer, not in the events.

This, it may be added, is the type of finding that invariably emerges when a critical and inductive examination is made of any of the smooth explanations that were the crop of the anthropology of half a century ago, and which are still the inviolable stock in trade of the anthropology dealt out in the Sunday newspapers, the drawing room, the books on "social evolution" and the mass of semi-scientific, unscientific, and pseudo-scientific lit-

erature that sets solution before inquiry. The matriarchate, the priority of female lineage, the antecedence of the clan to the family, promiscuity and group marriage, the fundamentality of the totem idea, the mana concept as the basis of religion, the development of alphabets from pictures, of geometric ornament from symbols, strange vestigial survivals generally—all these delightfully exotic, fascinatingly romantic, and often alluringly shocking views that have given anthropology most of its broad appeal, have their glitter crumble into dust as soon as critical method is applied to them. To most ethnologists of his own school, Dr. Lowie's elaborate demolition of the Schurtz speculation may seem unnecessary. Its wider significance is as a symptom of the growing conversion of anthropology from the toy of fanciful half scholarship to a product of scientific method.

Finally, too great credit can hardly be bestowed on the institutional side upon the American Museum of Natural History, its anthropological department, and Dr. Wissler, for the clean, business-like, and effective manner in which the undertaking represented in this volume was planned, carried through, and concluded. Without announcement or formal flourish an important scheme was formulated, put into operation year after year, systematically but never unbendingly adhered to, with cumulative results, and concretely accomplished through the cooperating efforts of a staff of five participating students, one of them a member of the native race whose institutions formed the subject of the inquiry. The parts of the volume were published promptly, the summaries undelayed, the typography, illustrations, and index are of the best. The record is one with which the Museum may well be content administratively as well as scientifically.

A. L. KROEBER

THE PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES

THE eleventh number of Volume 3 of the *Proceedings of the National Academy of Sciences* contains the following articles:

Am. Museum Journal, Nov. 1917.

Age-Societies of the Plains Indians

By ROBERT H. LOWIE

Since 1899, when Dr. A. L. Kroeber, now of the University of California, began his researches among the Arapaho, the department of anthropology of the American Museum has been almost continuously engaged in an investigation of Plains Indian organizations. Under the curatorship of Dr. Clark Wissler the field was parceled out among different members of the staff, Dr. Wissler himself devoting his attention to the Oglala, the Blackfoot and the Pawnee (the last with the aid of Mr. James A. Murie, a chief of the tribe), while to Mr. Alanson Skinner were allotted the Plains Ojibwa and several Southern Siouan tribes, to Dr. Pliny E. Goddard the Sarcee, and to the present writer more particularly the Crow, Hidatsa and Mandan, as well as a number of other tribes imperfectly known in this particular respect. After years of labor this work has now drawn to a conclusion and the final paper of a thousand-page volume is being issued under the title *Plains Indian Age-Societies: Historical and Comparative Summary*. Some of the more general results may be of more than merely technical interest.—THE AUTHOR

AGE-SOCIETIES occur, strictly speaking, among only five of the Plains tribes, the Hidatsa, Mandan, Blackfoot, Arapaho, and Gros Ventre, and the system of the first-named may be taken as typical. Among the Hidatsa the entire male population was divided into about ten societies, each composed of men or boys of about the same age. An individual did not belong to a society automatically by virtue of his years, however; rather was he obliged to buy membership in company with his age-mates. Thus, young boys of, say, ten would not form any organization, but as they grew up would come to covet membership in the lowest grade, the Stone Hammer Society, then held by their immediate seniors. That is, they desired to possess the privilege of performing a certain dance, of wearing the distinctive regalia of the organization, and exercising whatever other prerogatives were bound up with the native notions concerning the Stone Hammers. In order to consummate their wishes, they dispatched gifts to the older boys, whom they humbly addressed as "fathers," and these attempted to fix as high a purchasing price as they were able to extort. For possibly ten or even twenty nights the members of the younger group were obliged to feast the sellers and give presents of blankets and horses, and when the older group had made the requisite paraphernalia and conveyed necessary instructions to the buyers, the purchase was considered complete. The younger boys then paraded about the village with their newly acquired badges and performed the newly learned dance, while the "fathers" merely acted as musicians—and thereafter had no more rights to Stone Hammer membership. It was now the turn of the older boys to purchase entrance into the next grade by going through essentially the same rigmarole, and so on throughout the entire scheme of organizations.

One problem in particular aroused the interest of students in connection with this institution. What is the relation of the age factor to purchase? Organizations founded

purely on age would not involve any entrance fee; on the other hand, if the purchase were essential, why were fellow-members always of the same age? It would seem plausible that on that assumption a well-to-do youth might rapidly acquire one membership after another until he had attained to the highest rank. This puzzle becomes all the more pressing when we find that the organizations graded by age among the five peoples mentioned occur among other Plains tribes without any grading or age qualification, but that the purchase occurs only with the age factor, although it would seem that these two elements were mutually contradictory.

One of the first points that became clear as the investigation progressed was that any particular society was not essentially connected with a particular age even though all the members were age-mates. That is to say, it appeared that while, say, in 1840 all the individuals in the Dog Society were forty-five years old, in 1860 they may have averaged sixty in the same tribe, and perhaps only thirty elsewhere. The astonishing fact also came to light, that one and the same group might simultaneously hold several memberships. In 1910 an old Hidatsa informant still considered himself a member of a society he had joined at seven, of another he had entered at twenty, of a third he had joined at twenty-seven, and of a fourth he had purchased at about forty-five. Similar statements were obtained from other witnesses, and they were uniformly accompanied by the explanation that a man had a right to every society he had ever bought which for some reason he had never sold. This seemed to establish definitely the predominance of the purchase notion. If the societies had any direct relation with age, it was absurd to assume that a group or individual could be simultaneously connected with several groups.

Nevertheless this could not be the whole story, since the age of all the members of a society at a particular period was practically uniform in spite of the variations in age

permissible for one and the same organization at different times. The whole matter is cleared up only when we understand the mode of purchase, which is collective rather than individual. A group of young boys playing together and forming approximately an age-group are constituted into a definite body by jointly passing through the initial social experience of buying the lowest grade. By simply continuing together at every successive purchase, they form a permanent union of age-mates, and since all groups follow the same course of action, the association of organizations with bodies of coevals is quite intelligible.

The Plains Indian age-societies are especially interesting because of their analogies to institutions of remote areas, which, however, merely serve to throw into relief the distinctive peculiarities of the American phenomena. Thus, in Melanesia all the men are ranged about a number of fireplaces in a clubhouse, each fire being associated with a distinct grade of the order. Each degree is purchasable and accordingly the series seems comparable to the Hidatsa scheme. Yet it differs fundamentally, because in Melanesia the buying is a purely individual affair, so that most men never advance beyond the middle ranks, while only the especially wealthy and fortunate reach the top. In other words, here there is grading with purchase but no suggestion of age-societies. On the other hand, the Masai of East Africa have age-companies formed during the tribal initiation ceremonies. The principle is really very similar to the Hidatsa one, for here too the organization of a permanent social unit results from a joint social experience. But the nature of that experience is very different from that of the Hidatsa, and more particularly, there is no trace of the element of purchase which figures so largely among the North American Indians. In short, there is merely analogy not homology and the Plains Indian age-societies remain an institution *sui generis*.

The data collected on the Plains Indian age-organizations have a direct bearing on certain sociological theories that have figured prominently in ethnological literature. The late Dr. Heinrich Schurtz, of Bremen, assumed that community of age was the earliest bond that united men into definite societies and that all other forms of organization, such as societies based on religious motives, came later in human evolution. At the same time he conceived the early division of male society to be according to three distinct groups, such as boys, married men, and old men. This was a very plausible assumption since such a rough classification

might be made even in primitive times, while a more minute division would seem improbable with people who do not reckon their ages by years. The Hidatsa phenomena show that refined classification is quite possible at a primitive level. All that is needed is that a group of boys should be consolidated by jointly acquiring a certain status and that this practice should become fixed for succeeding groups of boys. Then the total number of companies in a given tribe will simply depend on the number of groups which have passed through the initial experience. Among the Plains Indians the permanence of the bond is emphasized by the fact that the same group of individuals which purchased the Stone Hammer membership will later buy the Kit Fox, Dog, and all other organizations. But this is not essential, since the Masai have permanent age classes with definite privileges but only a single social experience, the initiation ceremony, through which all tribesmen have to pass. The indispensable thing is thus merely that the first welding together should establish a permanent bond of union.

We can, therefore, understand how as many as ten or more age-groups could readily develop in a tribe without any conscious subdivision of the whole population. It is also plain that age plays an important part, since it is the bond that unites the boys before they collectively acquire the status of the lowest grade. Among the Plains Indians, the factor that unites individuals into a group is really age, as Dr. Schurtz contended, but the factor that determined that the group so constituted should become the possessor of certain ceremonial and social prerogatives, was purchase.

A very important problem is whether the age-grading is the earliest bond of organizations in human society. The Plains Indian phenomena definitely contravene this hypothesis. While it is true that some of the organizations seem to have originated among the tribes with graded schemes, other societies certainly developed elsewhere and were secondarily united with the age series. There can be no doubt that in some instances admission is based on purely social considerations regardless of years, while in others a certain form of religious experience shared by a group of men constitutes the sole bond of union. In short, age is certainly a real force in the evolution of tribal societies, but it is far from being the only socializing factor and there is no reason to think that it preceded all others, least of all, in North America, where organizations not based on age far outnumber those that are.

PUBLICATIONS ON THE INDIANS OF THE NORTHERN PLAINS

For several years the department of anthropology of the American Museum of Natural History has been engaged with a cultural survey of the Indian tribes occupying the northern plains: viz., the Sarcee, Northern Shoshone, Blackfoot, Crow, Gros Ventre, Assiniboine, Hidatsa, Mandan, Dakota, Plains Cree and Plains Ojibway. Though far from complete practically all of these tribes have been visited and systematic continuous investigation inaugurated for the next five or more years as the case may demand. The formulated results are now appearing in the "Anthropological Papers" of the American Museum of Natural History, seven papers having been issued to date, four of which were previously reviewed in *SCIENCE*, October 16, 1908. The three to be discussed here are: *The Northern Shoshone*, Vol. 2, Pt. 2, pp. 165-306, Plate I. and 20 text figures, January, 1909, and *The Assiniboine*, Vol. 4, Pt. 1, pp. 1-270, Plates I.-III., and 17 text figures, November, 1909, both by Robert H. Lowie; *The Material Culture of the Blackfoot Indians*, by Clark Wissler, pp. 1-176, Plates I.-VIII., and 103 text figures, March, 1910.

The Northern Shoshone.—In 1906 Dr. Robert H. Lowie began an investigation of the northern Shoshone, or Snake Indians. His results, as published, show that in economic life these Indians manifest predominately the traits of the plateau area west of the Great Divide, especially in the use of seed-grains and fish, the buffalo being little more than an incident in whose pursuit they made occasional journeys into the Missouri basin, a practise no doubt greatly stimulated by the acquisition of horses. In costume,

the first paper in the present volume, the effect of variations in the trade winds upon the temperature of the water in the North Atlantic. The second paper is a lengthy discussion by Mr. J. S. Dines of all the data for St. Helena which the Meteorological Office possesses, especial attention having been paid to the anemograph records. The third paper consists of a mathematical demonstration, by Mr. E. Gold, of the relation between the variation of wind velocity and barometric fluctuation, one of the few meteorological problems amenable to direct mathematical treatment. Here again application of the general theorem to the particular case of St. Helena has been made.

THE first number of the "Monthly Meteorological Report of the Australian Commonwealth" has recently been distributed. This publication will doubtless serve the same purpose in Australia that the *Monthly Weather Review* does in the United States. Under the direction of its meteorologist, Mr. H. A. Hunt, the Commonwealth Bureau of Meteorology has had a remarkable growth, and now ranks with the weather services of older countries. As an example of its work note should be made of its latest bulletin, "On the Possibility of Forecasting the Approximate Winter Rainfall for Northern Victoria," by Mr. E. T. Quayle, an assistant in the bureau. The author has found a close agreement between the winter rains of that country and the preceding monsoonal depressions. The practise of forecasting even the approximate rainfall of a coming season by a government service is not common. The same bureau has also published an average rainfall map of New South Wales, the first of a series, now in the course of preparation, which will include all the states.

however, the northern Shoshone, like many of their southern relatives, bear a general resemblance to the plains type, but in the former use of the woven rabbit-skin robe and the exceptional use of the buffalo robe we have again plateau traits. The manufacture of coiled and twined basketry further differentiates them from the northern plains Indians, as do the absence of the elaborate medicine bundle, the sun dance and the men's societies. Decorative art seems, however, to have been strongly influenced by the northern plains; but while this influence is also evident in mythology, the predominating characteristics are those of the plateaus and California. Thus, on the whole, it appears that the older theory that the northern Shoshone formerly lived on the Missouri has no support, other than the traditions of battles among the Blackfoot, Crow, etc., all of which are probably based upon chance encounters with Shoshone hunting parties.

The Assiniboine.—Dr. Lowie also made a special study of the mythology and culture of two divisions of the Assiniboine, those at Morley, Alberta (1907), and those at Fort Belknap, Montana (1908). One of the important problems, here, arises from the assumed late separation of the Assiniboine from the Dakota and their subsequent association with the Cree between whom an important exchange of cultural traits must have occurred. Enough linguistic data were secured to show a distinct dialectic difference between these two divisions of the Assiniboine, suggesting that their separation from the Dakota must have been earlier than is really assumed. However, further investigation of the speech current among the various bands of Assiniboine now living in Saskatchewan will be necessary to a satisfactory conclusion. In mythology we again find evidence for the remoteness of the separation from the Dakota in so far that the Assiniboine show far less of the elementary Siouan characteristics than of the Algonkin. Among the close neighbors of the Assiniboine, toward whose mythologies are shown almost equally marked relationships, are the Ojibway, Cree, Blackfoot and

Gros Ventre, all highly individualized Algonkin tribes. Ceremonial organization is another aspect of culture, receiving special attention in this paper, one of the most striking points being that the Assiniboine have a number of ceremonial societies in which there is no conception of anything like a series or age gradation, but in which, nevertheless are shown certain other analogies in procedure and regalia to these widely distributed plains features. This result led the author to a special examination of the various tribal associations so far reported to determine in how far the age classification series holds for the area at large. His conclusion is that neither the age relationship nor any other conception can be taken as the controlling principle, but that each tribe has in a way constructed its societies by "the novel synthesis of singly wide-spread elements" and not by the complete adoption of any one organization. This is, of course, largely theoretical and in opposition to the sociological theories of Shurtz and Webster, but in line with the synthetic structure of the sun dance, pipe ceremonies, beaver ceremonies, etc., of the same area noted by American anthropologists. In addition to these major considerations the paper contains data on material culture, art, social organization and religion.

The Blackfoot.—In 1906 Dr. Wissler visited the Blackfoot Indians in Montana, giving special attention to their material culture, the subject of the latest publication in this series. In this paper fairly complete data are presented under the heads of food and its preparation, manufactures, transportation, shelter, dress and weapons. Taking these aspects of culture alone, the Blackfoot manifest no important traits not shared in almost equal measure by some of their immediate neighbors, so that it is impossible to credit them with tribal individuality or to determine their relative weight as a factor in the development of plains material culture. A critical examination of available historical data shows that there is no firm foundation for the current theory that the Blackfoot migrated to the plains from the forests of the

Mackenzie basin within two and a half centuries, the presumption being that they have occupied the plains for a long period, whence their want of individuality can not be explained as due to disorganization attendant to the hasty assimilation of a new culture. Sufficient comparative data have been introduced under the various headings to show the relative position of the Blackfoot in the northern plains group and, in turn, the relative position of this group in the area at large. It appears that the material culture of the northern plains tribes was relatively least influenced by the tribes of the plateaus on the west, but profoundly affected by acquisitions from the south and the east. Thus, while tradition gives the Blackfoot and Assiniboine women of former times a costume like that of the Cree and Salteaux, within the historical period they have used the well-known form of the Kiowa, Ute, Arapaho and Dakota: again, the tipi of the Blackfoot, like that of the Crow, is of the type known to some D  n   tribes and also the Salteaux, in contrast with the type used by the Arapaho, Dakota, *et al.* Throughout the paper a number of problems in the distribution of cultural traits have been defined for which additional data are needed, especially from the Cree and Central Algonkin tribes.

In closing, it seems in order to state that field-work among the Cree, Salteaux, Crow, Hidatsa, Mandan and Dakota has been sufficiently advanced to announce papers upon these tribes as the next issues of the series.

CLARK WISSLER

THE DISCOVERY OF FOSSIL MAMMALS IN CUBA AND THEIR GREAT GEOGRAPHICAL IMPORTANCE

FROM the standpoint of geographical evolution there was no more important announcement at the meeting of the Geological Congress at Stockholm than that of the discovery of a large mammalian fauna in the Pleistocene caves of central Cuba, by Professor de la Torre, of the University of Havana. Hitherto the known mammals of Cuba consisted of four living and one extinct species of rodents, and

one species of edentates, according to America's great naturalist, the late Professor E. D. Cope (whose conclusions were necessarily adopted by the writer as long ago as 1894). Messrs. Vaughan and Hayes, although not workers in vertebrate paleontology, in writing of Cuba discredited the occurrence of even these few fossils, as reported by other observers, and, furthermore, reported as wanting, any Jurassic formation in Cuba, although such had been found at an earlier date.

Professor de la Torre's collection embraces a large Pleistocene fauna of rodents, edentates and other vertebrates, as also excellent specimens of Jurassic fossils. Some of these were exhibited at Stockholm and others are at present at the American Museum of Natural History, New York. These Pleistocene mammals, or other immediate ancestors, must have reached the island of Cuba by land tongues, now submerged to 6,000 feet, except those by way of Florida (of which Cuba is the extension of the continental mass), which are now only 2,100 feet below sea-level. These submerged land tongues are themselves incised by ca  ns, which were once land features, and show the recent submergence of the whole Antillean region, which hypothesis was also accepted by Cope. The migrations of these animals confirms a late great continental elevation, which can not be ignored in any theory relating to the origin of the glacial period. From the biological point of view, these fossil remains are of extraordinary value, and Professor de la Torre is to be congratulated on his remarkable discovery.

Apropos, it may be stated that the writer has also himself obtained from a cavern near the boundary line, on the French and Dutch Island of St. Martin, the remains of *Amblyrhiza*, a Pleistocene rodent as large as a deer; notice of which has not hitherto been published. This rodent reached the northeastern Antilles from South America (Cope) by land tongues between the islands, now submerged, in one case to 4,000 feet.

The physiographic evidence of a similar late great elevation of Europe, based upon now submerged ca  ns, has also been shown by

sire (Enhancer's Leader 2d) and his dam (Enhancer's Leader Belle 2d) were very closely related. Grand Leader 2d was an inbred boar himself, Lord Premier appearing four times in the fourth generation. Finally an examination of the extended pedigree of Lord Premier shows that he was somewhat inbred himself, particularly on his sire's side. Longfellow 16835 appears twice in the first four generations and Charmer's Duke 13360 appears four times in the first five generations. All the animals on the mother's side of the pedigree of this boar were bred in England except his dam. She was bred in Canada.

Photographs of Enhancer's Leader 2d, Enhancer's Leader Belle 2d and of three of the inbred 1931 spring litter are presented in Figure 9, to illustrate the type of Berkshires that are and have been used in this study.

Summary

1. The average number of pigs farrowed, in the inbred litters, have been greater (9.78 pigs per litter) than the

average for the Berkshire herd (8.14 pigs per litter for the years 1919-1926 inclusive).

2. There has been a slight but gradual decrease in the number of pigs farrowed in the inbred litters since 1923. The last litters, however, were the first litters of the sows in question, which tended to be smaller.

3. The type of the pigs in all the inbred litters have been similar.

4. There has been no noticeable color change or structural abnormalities in any of the inbred pigs.

5. The results obtained thus far seem to agree in part with those of Miss King (no noticeable loss in size or vigor) and in part with the results of other workers (there has been a slight decrease in size of the inbred litters).

6. The standard deviation from the mean of the inbred litters is 2.56 with a probable error of $\pm .288$. The standard deviation from the mean of all Berkshire litters from 1919 to 1926 inclusive is 5.34 with a probable error of $\pm .302$.

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The Disintegration of a Primitive Culture

THE CHANGING CULTURE OF AN INDIAN TRIBE, by MARGARET MEAD. Pp. xiv+313, price \$4.50. Columbia University Press, 1932.

THE relationships between primitive and advanced peoples constitute one of the major problems of modern civilization, especially any civilization,—if there be one— which looks far into the future. Such problems have existed for ages, but have generally been left to solve them-

selves, the contacts beginning with invasion and in modern centuries going on in the hands of missionaries and traders until, with increasing numbers of the white invaders, problems of administration and government obtruded themselves. Only relatively recently has the more enlightened study of the effects of such racial contacts from the anthropological, sociological and psychological points of view begun to suggest how much con-

tacts should take place and how they might be controlled.

Dr. Margaret Mead has made a study of the present condition of a tribe of Plains Indians in the buffalo country west of the Mississippi. She sketches briefly the earlier history of the tribe since contact with the white man began about the middle of the seventeenth century. The identity of the tribe is disguised under the name Antlers, the names of individuals are also altered throughout and sometimes suppression of other information is considered necessary, in order to avoid disclosing the particular reservation where the data were collected.

The tribe originally built earth lodges (some of large size), hunted buffalo, cultivated maize, held potlaches and had a complicated system of kinships and taboos. By the middle of the nineteenth century their reservation was demarcated and they were nominally Presbyterians. Their present condition, as it has developed since 1900, is detailed in this book, and shows how misguided Government administration has resulted in the disintegration of their own primitive culture and its replacement by utterly chaotic social and economic conditions, rapidly changing in each generation with increasing dissatisfaction of both Indians and whites.

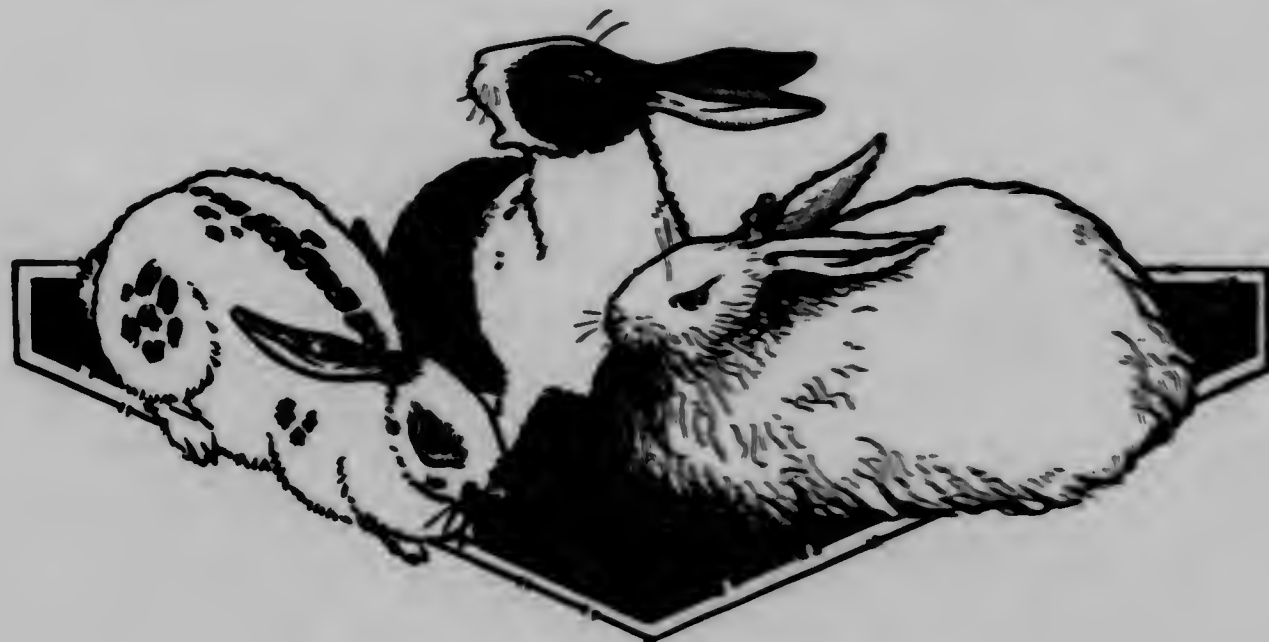
No particular blame can be attached to the American government for this state of affairs. Successive generations of officials no doubt acted in what they considered the most enlightened way to produce rapid ab-

sorption of white civilization by a primitive people. But their policy was determined at a time before the problems relating to the psychology and development of primitive peoples and their reactions to white influence had even been defined. The Indians received the franchise, on the generous supposition that this would be an aid in absorbing an alien European culture much of which was beyond their comprehension. At the same time they were made land owners, each family receiving a parcel of at least 40 acres, although the whole conception of individual land ownership was entirely foreign to their tribal organization. The leasing and sale of their property has led to the eruption of white people into the community, with its many disintegrating secondary effects.

Although it is now impossible to return to earlier conditions, yet many improvements could doubtless be made, for instance by altering the present system of education, which unfits so many of the Indians for later life and uproots the foundations of their original morality. As a study in maladjustment and its results, this book should be useful in indicating directions in which the administration of Indian reservations could be altered for the benefit of all concerned, although the authoress is at pains to make her work a purely scientific investigation of conditions as they now exist.

R. RUGGLES GATES

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Plains Indian Stories by Labia Blanco

"I want him, of course, if he is there."

"Oh, he is there all right. I saw his tracks there."

I went to the major and asked permission to hunt the bear.

"Yes," he told me, "hunt him, but don't crawl into that cave after him, as Mr. Crawford was going to do."

I had no idea of doing that. I did not want bear quite so bad as that, and I don't think that Crawford had ever meant to crawl into it, either. He was not exactly a fool.

On my way to the cave I began to study plans to get him out of it if he was in it, without going in and dragging him out. I first thought to climb up there, then give a shot or two into it, but I dismissed that plan. I might kill him if I did, and would not know it. I was not going in to see. According to some authorities on bears, it takes a man and a gun half a day to kill one. Sometimes it does. I have followed one with a rifle a half day, then did not kill him. I don't know that I ever wounded him, though I shot at him often enough. And again I have killed one in less than two minutes with a pistol. It depends a good deal on where you hit the bear, how many shots it takes to kill him.

I got down in front of the cave and examined the ground for bear signs, but found none. The ground, what little there was of it that was not covered with loose rocks, was hard yellow clay—an ox team passing over it would hardly leave a sign.

Gathering up a lot of dry brush weeds and leaves I piled them in front of the cave, set them on fire, and going off a few feet to one side waited for the bear or bears to come out. I had a Spencer carbine and Colt's pistol, and thought that I could stop all the bears that might be in there. The wind drove the smoke right into the cave, the fire burned out, but no bear made his appearance. There would be no danger in going into that cave now, and I tried it, but there was too much smoke in it yet, I had to crawl out. I went back to camp and Crawford wanted to know if I had seen the bear.

"No, sir, there is none there, nor has there been any lately."

"Oh, yes, there had been"; he had seen their signs.

"You could not see a sign there with a microscope. The ground is too hard."

"There might be plenty of sign there that an old hunter could see, and you could not. You have not been in this country long."

"Yes, I know; but we have men in this troop that have been, some of them twenty years out on the frontier. I myself have been pretty well over the northwest, and have hunted with Sioux Indians. They know something about signs, don't they? We are not all tenderfeet if we were born and raised in the big cities."

"Yes, maybe so, but there has been a b'ar up thar."

"Well, as the major told you, we will let him stay up there. I can't find him."

We started again early next morning to hunt those Indians of Crawford's, and soon after breaking camp it began to rain and kept on raining all forenoon. The major went into camp as soon as he could find grass and wood. We did not need to look for water; we had all we wanted of that and some more.

The timber here was cypress, and there was a lot of blocks of it that had been cut to make shingles out of which had been left; Indians had probably interrupted the shingle-making before it had got well started. That had been some years ago, "before the war" probably, to use Crawford's favorite expression when giving the date of his numerous fights with Indians. We tried to start a cook fire with those blocks, but they were wet and would not burn, only smoke.

I got a liberal dose of this smoke, and a small dose of cypress smoke is a cure. Then I hunted up something that would burn more and smoke less, and found a lot of dead cedars, but it took hard work to get wood off them, the branches had to be broken off. We had no ax; we never carried one on a pack mule then, and there is hardly anything that can be carried on him that is needed oftener. When I had anything to do with the pack trains in after years I always carried at least one ax in a leather sling, and a spade. While riding through the rain to-day we were continually passing small bunches of cattle. They belonged to ranches away east of this, and had wandered out here.

Nearly every cow had a different brand, some had none at all. They were still tame and would let a man ride close enough to them to examine them; but farther west could be found thousands of them that we could not get within a mile of; they had been born wild. Crawford would examine every bunch we passed; he wanted to see if any of them had his brand on, he said. This was what had brought him and us here, he had seen no Indians, but wanted a cavalry escort so that he could come out here and look up his and his neighbors' cows.

These men would not think of coming out here alone. If they did they would have no trouble in seeing all the Indians they wanted.

I noticed the major watching Crawford while he was engaged in taking the census of these cows, and I knew that if Crawford did not find Indians in a day or two he would hear from the major. The major had risen from the ranks and could swear not only like the proverbial trooper, but like half a dozen of them. He dare not curse an enlisted man, and never did; he would stand a

effort over much of this lake. Mrs. Weaggle told of two scared men who crossed the lake and were caught by a cyclone while nearly eighty rods from land. They saved themselves for a time, but at last the waves threw them into the water.

"And you know," Mrs. Weaggle said, "the water wa'n't two feet deep, and they waded ashore, dragging their pirogues behind them."

Nevertheless, the wind sweeps some big waves on water no deeper than six feet. Our trip was made against a breeze which threw the water in spray from the tops of waves so high that they were higher than my head as I sat in the stern of the boat—short, choppy waves, which were hard to row against. At times we were on the point of going ashore and camping till night, and once, when the true course was across a bay from point to point, we were compelled to run ashore and wait the passage of a flaw of dry gale. "Shore" was a cypress brake, only a couple of inches above the level of the lake water, and reached only by wading through a thin layer of water, jumping from root to fallen branch to keep from being mired when we left the boat. Here in the dirt we found deer tracks, and the trees should have been alive with squirrels, but the wind kept them under cover. About the only life we saw were the white snake hawks—the most beautiful and most graceful bird I had ever seen. They floated in the air, their swallow tails undulating, and their wings bending, tossed up and down by flaws in the wind, or by their own maneuvers and crying in their doleful fashion. They are called "gulls" in the swamps. Their aerial dance above the cypress brake and over the dead wood at the edge of the lake was a spectacle that left one of the most vivid impressions of the trip.

All day long we worked our way down the lake. We entered Six Mile Lake (foot of Grand Lake), and as night came on, followed the lights into Flat Lake, and then, by night, ran into Berwick Sound. Here was Morgan City on our left, and a railroad bridge ahead of us. We landed at an oyster boat, where I left my duffle and boat in charge of an oysterman, a round-faced, good-natured Italian.

Reed led the way to Mrs. Booth's boarding house, and there I remained a few days, getting ready for the trip home.

Morgan City has only a couple or three thousand inhabitants, but has more boats registered there than either Galveston or New Orleans. Its oyster fleet and fish markets supply much of Texas, Louisiana and up-the-valley places with their catches. The streets are laid with oyster shells, whose bright white under the sunlight is trying on the eyes, but in the evening, under the electric lights, Morgan City is a pretty place for walking. I ate oranges and oysters and other things, comporting with the surroundings for a few days, and then sped away for New Orleans, behind oil-burning locomotives, on which a fireman's life must be much pleasanter than in a coal-burner. The region, by the way, was greatly agitated by the oil question, a Standard Oil man plying me with questions about the oil derricks I had seen up in the swamps. The "wild catters," as he called them, being likely to make interesting discoveries up there. The Louisiana oil, so far as found, is thick and "asphaltic," or gummy.

The train was run on a barge and towed across the Mississippi, after passing through miles of rice plantations, and then we ran into New Orleans, the city without a hill, and in whose principal public park were signs prohibiting the shooting of birds or other things. The river was full of drift, and I looked up stream and realized for the first time how distant St. Louis was, and yet how big and unalterable was the connecting link.

I got my ticket to New York, via the steamer Proteus, first of all, and then I wandered around the city for a few hours. It was a curious place, very like book descriptions of it, except that the French quarter is always given an exaggerated place in the accounts. I found it very like other American cities I had seen, the buildings in the business part being of similar homely construction. Here and there were the "quaint" French dwellings, built of old, and among the faces seen were some very charming ones—but it was locally American, and not "southern."

My Uncle Anson, whom I had visited at St. New Orleans, and passed on hour with him. hours after reaching the city, I boarded and soon the steamer cast off, and the boat down stream. It was a hundred miles passes. At first, there were plantations on them—sugar houses—but were looking across wide marshes, contrasting remarkably with the torments of thirst and

Gulf waters as I came As we neared the but it was less interesting than the Eads channel, the Gulf itself. we went.

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different angle from that of a steamboat traveler. Had I started in a cabin-boat, instead of a skiff, the experience would have been different; so, too, would a gasoline boat have given a new view. Doubtless, the man with a couple of months of time and the inclination to take it, would find a cabin-boat vacation on the Mississippi River below Cairo an attractive and interesting experience. In a touring gasoline, the lower river and its tributaries offer as interesting and little known country as can be found anywhere.

The Mississippi has a charm all its own. When I told cabin-boaters that I probably wouldn't go down the river again, they laughed knowingly.

"That's what they mostly say, the first trip," they said. "But, shucks! First a man knows, he's right back yeah again, he shore is. Lan', but this ole Yellow Gut has a power of sentiment into it, yassseh, yassseh! But 'tain't hard driftin', nosseh, hit shore ain't. A man's peaceable on the river, he ain't beholden to nobody."

RAYMOND S. SPEARS.

Hunting Indians—and Cows.

Soon after the close of the War of the Rebellion a number of troops of the Fourth Cavalry were sent out to the different posts on the Rio Grande. Their principal business was to watch Indians, who would cross over from Mexico to steal horses. The Indians seldom destroyed ranches, that would not be good business. The men living on the ranches, if not driven off or killed, would in the course of time gather up another bunch of horses for the Indians to steal. Our troop and one other were sent to Camp Verde, Tex., which was one of the frontier posts then; about all the country west of it was still out of doors. We began hunting Indians as soon as we had got here. There were a good many settlers east of us and several small towns. Kerrville and Bandera were the nearest ones. They are probably large towns now.

The citizens were continually losing horses, and we were kept busy hunting them. The greatest drawback to our finding them was due to the fact that these men did not report their losses soon enough, and about the time we would be told of it the Indians would be safe in Mexico. There was an arrangement now under which we could follow Indians to Mexico, and the Mexican troops could follow them across to our side of the line if they wanted to do so. They generally did not, though. They ran them over to us, then quit, while we have often followed them 150 miles into Mexico. I have been as far down as that after them myself while in the Fourth Cavalry. We had no such arrangement when we first went across, and had there been any civil government in Mexico then our presence over there would have been the cause of an extended diplomatic correspondence between Mexico and Washington to explain what we were doing over there; but at this time there was no civil government in Mexico, or rather there were two so-called governments. General Juarez was at the head of one, the Emperor Maximilian had the other, and they were too busy just now trying to keep out of each other's way to pay any attention to us.

An old gentleman who had a ranch near Kerrville lost a bunch of horse and told us about it. We followed up the Indians, and crossing the Rio Grande a few hours after them, ran into their camp at night when they thought they were safe at home. We got back all the horses, the Indians making their escape on foot, all except a few that came in contact with our pistol balls; they staid where they were.

These Indians were Lipans and Kickapoos. They had originally belonged in Texas, but had emigrated to Mexico and would now come over on foot, then ride back on stolen horses, sell them to the Mexicans, and come and get more. We returned the horses to where they belonged and a short time after Mr. Crawford, their owner, paid us another visit. He had found us more Indians, but they had not taken his horses this time. He had been west of this hunting up his cattle and had seen a bunch of Indians, how many he did not know; he had not stopped long enough to count them.

About a dozen of us under command of our first lieutenant, a brevet-major, were sent out with Crawford to help him count those Indians. He led us up through Bandera Pass, a few miles south of the post, then turned west. Had he kept on west far enough we would not have needed him for a guide. Edwards county was out here, and we had been all over it lately. After going west a while he turned north again, and late in the afternoon we rode past a chain of hills. They were off to our right, and I noticed when passing one of them what looked like a small cave up in the side of the hill, twenty feet above its base. Crawford saw it, and riding over got off his horse and examined the ground. There certainly could not be Indians in that cave, I thought; not more than a dozen, anyhow. It was about two feet wide and hardly that high at the entrance. After looking at the ground, or rocks that lay on the ground rather, Crawford climbed up to the cave. The major had stopped the column, and now called out:

"What have you got there, Mr. Crawford?"

"I think there is a b'ar in that cave, sir."

"Let him stay in there then, and come on. I want to make camp as soon as I can now."

Crawford mounted and came over to us, and the major asked him if he had meant to crawl into that cave after a bear?

"No, sir; not all the way in. I only wanted to find out if he was thar or not."

"Well, if he had been there, you would have found it out pretty quick."

I nearly choked myself trying to keep from laughing. I rode just behind the major, and it would not do to laugh. This Mr. Crawford was a curiosity. He was about sixty years old and rode with his stirrups so short that his knees were shoved half-way up to this chin, and in riding he leaned forward in the saddle something as English hunters are represented in newspaper cuts as doing, but no fox hunter or anyone else could follow the hounds riding as he did. I could not, at least.

We were taught to ride with stirrup straps long enough to allow our legs to extend their full length, and to sit erect in the saddle. Had we leaned forward, as he did, an officer's sabre across our backs would have straight-

there are river men who cut their boats loose at night, put a lantern on the roof and go to bed and sleep till sunrise without a qualm—on a falling river; that is, in windy weather, night traveling is the only way of avoiding "bank-doping" for days at a time. Had we not floated on this night, and made an eddy above town from which we worked down by main strength, the sandbar bay would have held us a week in the storm that followed.

We remained at landings only long enough for the man to see if he could do any trade. After selling a "line," he would drop down the river a mile at least, and usually around the next bend to pass the night. So we came to Salem Landing at last, and here we were caught by a cyclone—my second one—and as violent storms always are on the river, it was exceedingly interesting to us while it lasted. RAYMOND S. SPEARS.

When the Indians Hunted Me.

I PUT in twenty years on the Southwest frontier, most of it in hunting Indians. Once in a while, though, the Indians would change the programme and start to hunt me. This was one of those times.

Prior to 1861 a large business was carried on driving cattle from the ranches about San Antonio and west of it across the plains to California, over what was called the old California trail. It led from the settlements up past where Fort Concho was afterward built; there is a large town there now, San-something or other, I have never seen it, and have forgotten its name.

From the Concho the trail continued on west through Cañon Pass, then crossed the Pecos River at Horse Head Crossing and so on west to California. The war stopped all this, and the first attempt made to resume it was in the spring of 1867.

The first herd to cross here was met west of the Concho by Indians. They got the cattle. The cowboys got into the cellar of an old stage ranch that had been burned long before by Indians. No more cattle were sent out just then, but we were sent up to old Fort Chadbourne to look after the Indians. Chadbourne had been a large frontier post before the war, it was one of the oldest on the frontier. Why it had ever been put where it was I do not know. Oak Creek, on which it had been built, was dry six months in the year and the water in it during the other six months could not be used until the doctor had disinfected it with permanganate of potash; at least that is what he said it was, but he may have been stuffing me. I am no doctor, only a third-class lawyer, and I was continually asking questions of these college graduates only to sometimes be given a lot of valuable information that I would afterward find to be of no value at all—it was of no value to me, anyhow.

There were very good rivers in this country not one thousand miles away, on one of which the post might have been built; I should have put it there; but I was not an engineer. When I had a military road to build—and I have had several of them—I built them without the aid of an engineer, only using picks, axes, and shovels, plows, carts and army mules. The nearest approach to an engineer I had was an enlisted man that I found could use a surveyor's transit. He tried to teach me the use of it, but only partly succeeded. I used him.

If I ran the road against a swamp I did not know any better than to go around it; then keep on. An engineer would have gone straight across it if it took him a year, with all the mules and carts in the country to do it.

This post was in ruins now and we let it stay so, and built Fort Concho where this one should have been built in the first place. I helped to build it, but was not the engineer. Colonel Strang looked after that part of the job. I shoved a plane. I saw the site of one post, some years after this, on which some engineer had spent several thousand dollars before he found out that the spring on which the post would have to depend for water only had water in it when it rained hard. This was Buffalo Springs, Tex. We took post at Fort Chadbourne, then were sent out on the North Concho River to camp. Here we escorted cattle across the plains. The different herds would be driven up here, then when five or six herds that would aggregate about ten thousand head in all had been brought here, they would be started across. These herds were driven about fifteen miles a day if water could be found at the end of that drive. Often it could not; then if it were not too far to it they would keep on. If it were too far for one day's march, they made a dry camp.

The only water here would be found in ponds—water holes. Some would be dry, but we would know that in advance. On the march the herds would be kept close up, one behind the other, only the cook wagon of each herd being between them; but they would be spread out on each side for a quarter of a mile or more.

We generally rode on in advance, and I have been sent to ride around the herds, going down one side and up the other at a walk or trot, when it would take me nearly all day to do it, the herd being on the move all the time.

The object in sending me was to see that everything was all right, or to give the alarm if the Indians should strike the herd. They might strike it miles in rear of the escort.

We took the cattle as far as the Horse Head Crossing on the Pecos River. Here a troop of the Ninth Cavalry (colored) took it farther west, or north, if it were going that way. Some of the herds went up to Fort Sumner, New Mexico. The Navajo Indians were there then, and these cattle were sent to feed them. The rest went to California eventually; it took them two seasons to go there.

A few miles short of the Horse Head Crossing is Cañon Pass, and east of this for thirty miles there was no water. The cattle would be suffering now for it. The cattle could smell the water miles away at the river, and if let go would rush to it, plunge over the high banks, and nine out of every ten would drown. A great many were drowned in spite of what we could do to prevent it.

The herds would be held at the Pass, then a few hundred at a time would be let go. They would rush across to the river, plunge in over the high banks if they did not happen to strike the ford, then fill themselves with water and swim out, the cowboys being stationed above and below to direct them to the ford; they could not get out anywhere else. It would take a whole day to get the

herd across in this way. We had taken one lot of cattle across the plains, and while waiting for the next drove to come up, I one morning asked permission to go hunting on foot.

The officer in command, our first lieutenant, a brevet major, told me to take my horse and to keep a good lookout for Indians while out. I had an opinion of how many Indians I would be likely to meet here—we never had seen any; but the major had a select assortment of opinions of his own, he would not want any of mine; I did not offer any.

I had been out an hour or more, had not seen any antelope, or Indians either. I was not looking for Indians, though, but could see them if they were here before I fell over them. I was a mile and a half from the river, but having gone south all the time, was still about opposite the ford.

The prairie here was a succession of low rolls, each one a half mile or a mile beyond the last one, and I had just crossed out of the rolls when I saw a man that I did not need a glass to tell me was an Indian, ride over the roll in front of me, and halt a moment. He was over a quarter of a mile away, and I continued to ride forward slowly while I studied out my plan of campaign.

I might ride that Indian down before he got home, he had a number of miles to go before he got there, and one of him was not at all dangerous. These Indians did not have the latest style of breech-loader. I had. This one probably had only a bow and arrow; he might have an old muzzle-loading rifle, he might as well not have it, though, if he kept on running, and he would if I took after him. But then I might charge into a hornets' nest behind that roll. The Indian had hardly come all the way from Arizona all by himself; he had come from there I knew, and his friends might be behind there now, having only sent him out to get me to charge him. I would not do it just yet, there would be plenty of time later on, let him moze down behind me until I get him nearer the ford and far enough away from the roll to overtake him, and far enough on this side of it to have time to go home if too many of his friends came. I ought to know nearly as much about strategy by this time as an Apache does. Without seeming to see my Indian at all I turned around and rode slowly toward the ford, keeping a good lookout over my shoulder, so as not to let him get in close enough to send me any arrows before I turned the Colt lose on him.

I kept on at a walk, the Indian took up a slow trot. "Make that trot a gallop," I said to myself, dragging my pistol holster in front of me, "come within good range of this pistol. I want to see if I can hit you."

At last I thought he must be close enough and was about to draw my pistol and meet him, when I saw half a dozen or more Indians come riding, all in a bunch, over the long roll he had come over. They halted a moment as they came in sight of me and sat there still in a bunch.

Some of our recognized authorities on Indians tell us that the Indians always march in single file, one behind the other, one ahead of the other; it don't make any difference which so long as they get in that file and stay there. And they will stay there; you could not get them to travel any other way if you paid them for it. This is according to Fennimore Cooper. He knew Indians from away back. His Indians always marched that way to avoid knocking down trees, but there were no trees here to knock down, so my Indians had come here in a bunch.

The Indians only stopped long enough on that hill to deploy skirmishers. They were going to run me down. They did not send a trumpeter to tell me so, but I felt it in my bones that they were, and now I suddenly remembered that the major had told me to look for Indians. I had better go in and tell him I had found some before I forgot it.

I never wore spurs for this horse, he did not need any. If I wanted him to run I told him about it and he would run all day. Leaning forward I let the reins slack, then digging my heels into his flanks yelled "Git!" and he got. I did not hold a watch on him while he was making that mile, I thought, though, that he made it in a minute. He must have taken longer than that, but he did not take an hour. The river at the ford was about thirty feet wide, too wide to jump, but it was only a foot deep, and without slacking up we plowed through it, and landed thirty seconds later in camp. I told the major that I had a few Indians out there, but they were too many for one man to bring in.

He yelled, "Saddle up! Be in a hurry now!" They hurried, but it would take them some minutes to get the saddle on, and give the Indians lots of time to get away. I did not expect to find many out there by the time we had got out. As soon as they had seen the horse and I plow through that river they would go on a scout and not stop long enough to draw any rations, either. We had about forty men here—enough men to eat up all the Indians I had out there if the Indians would only wait. That is what these men got their \$16 a month, board and clothes and do your own washing for, to eat up Indians or tell each other how fast they could do it if we brought along our Indians.

We got out at last to where I had left the Indians, but the Indians had also left. The major halted here, then sent me off on the right and sent a sergeant off on the left to see if we could find any signs of a trail. I found no trail, but did find five arrows that an Indian had spilled while charging on me or when he was sallying on the center after I had got clear off. I got the arrows and sent them by mail to a museum at home with a description of where they had been found, and the name of the tribe they belonged to. The points on them told me that the arrows belonged to Apaches. I did not know which band of Apaches then, but found out later on that they were the Chiriqua Apaches. This was in 1867. Years after, on April 23, 1882, I had the honor to meet them again, but I did all the chasing this time, or helped to do it. We had six troops after them, Gen. George A. Forsythe, our lieutenant-colonel, being in command.

We chased them into Horseshoe Cañon, on the line between New Mexico and Arizona, killed a few of them there, then chased them south across the Sierra Madre Mountains into old Mexico, then on down through Sonora, and while busy getting away from us the Indians ran on top of a big command of the Mexican cavalry and infantry almost before they saw it. They were too busy keeping ahead of us—we were only an hour or two behind them—to see much of anything ahead of them.

The Mexicans killed some and captured the rest and lining up the men shot them, then took the squaws and children home with them. We got there before the shooting began and left before it began also, the Mexican officer in deference to us postponed it. These Mexicans had lost their doctor in the fight; we had two, a regular and a contract surgeon, and they fixed up the wounded Mexicans. I went into their camp with the young contract surgeon to carry his "tool box," as he called it, and help him to hunt for balls and to cut off any legs or arms that needed cutting off. We found none that needed it, much to the doctor's disappointment. He was in the habit of telling me that he would rather cut a man's leg or arm off than eat. If I had a leg or arm to be taken off I would want him to do it; he was a good surgeon, but a poor shot on the wing.

The Mexican major in command was badly wounded and we fixed him up. Seeing that there were several boys among those prisoners, and knowing that the males would be shot, and finding that this major and I belonged to the same society, I put in an appeal to him to save the boys. He said he would not shoot them, but would shoot the men.

"You have my permission to shoot the men, and begin it right now," I told him. "These men have been trying to shoot me for years." But I am forgetting all about the time that they tried to shoot me at the Concho. The major took a survey of the country and then said to me: "Those Indians must have missed you by about an inch, did they not?"

"No, sir; they missed me by half a mile. I ride a horse that is not run down by an Indian pony every day."

"It's lucky you rode him to-day." Then to the men: "Here after this you men do all your hunting in large parties. I didn't want these Indians chasing you all over the country. Some of you are not riding race horses."

I was not riding one, either, but he was several removes from being a cart horse. I rode him a few weeks afterward across this same country 140 miles in twenty hours when I was going for a doctor to cut a cowboy's arm off. He had sent a charge of buckshot into it when climbing up on top of a wagon, and drawing his shotgun after him. It is the approved way to carry a shotgun, but I have always found it a safer plan to carry it by the stock; then if it does go off the other fellow gets the buckshot and the coroner can tell me that it was an accident.

CABIA BLANCO.

How I Found the Indians.

Editor Forest and Stream:

About the middle of March, 1870, our cavalry troop was sent out from Fort Richardson, Texas, to scout for a few weeks through the country west of that and look for Indians. I found there the Indians.

We had with us as a guest an English tourist, who was anxious to see all this country; he saw some of it before we returned. When I saw him ready to start I thought that about a week of this trip would be all he would need of it; but he roughed it with the rest of us and I never heard him complain. He messed with the Captain, a brevet-major, the only officer we had with us. When he was in the field the captain lived exactly as we did; he carried no canned goods, but ate what we did—bacon and bread, black coffee and bean soup and what game we could kill; buffalo were still very plentiful. The Captain carried no canvas, but slept as we did under the saddle blanket. This would be no picnic, looking at it from an English point of view, I thought.

We had been out a week when one afternoon we went into camp on a small creek that ran north and south, and across it to the west about a mile and a half away a low butte stood out on the prairie, and beyond it a mile still to the west was a rather high roll in the prairie that ran north and south. Before we had taken our saddles off, the Captain told me to ride over to the butte, stake my horse out at it; then stop on top of the butte until sundown and keep a good lookout for Indians. "We have seen no signs of them as yet," he said, "but this is about where I expect to see them, if we see them at all."

I started, and found the ground between the camp and the butte to be badly cut up with narrow ravines, which the water in the wet season had made on its way to the creek; and in getting to the foot of the butte I found another ravine here. It seemed to head at this ridge west of me and run straight to the creek. Crossing it, I staked out my horse here, leaving on the saddle and bridle. I rode with a snaffle bit that would not prevent the horse to graze; I might need him in a hurry.

I had a short heavy Marlin rifle, that I carried instead of the Spencers we were armed with. Climbing up on the butte, I found a flat place of about two acres that had a high coat of last year's dry grass on it. I could lie down in it and not be seen.

There was not a breath of air stirring, and the afternoon was warm for this time in the year. I had been lying here about half an hour watching that ridge—it would be on it that I would first see the Indians if I saw any—when a buck and a doe climbed up the butte and began to graze not 100 yards from where I lay. They never noticed me at all. I had hard work to keep from shooting the buck; but dared not fire a shot here, for it would notify any Indians who might be in the country just where I was. So raising my head above the grass I spoke to the deer. They gave me one frightened look, then left in about two jumps. I lay for another hour; then just after I had looked at my watch to note the time passing, I gave the ridge another look, and saw a man on a pony ride up on top of it from behind it and stop. In a moment another man joined him, then a third one, and they kept on coming until there were five of them. They sat on their ponies there, and seemed to be watching our camp, which was in plain sight over two miles away. Crawling through the grass and hugging the ground, I made my way to the edge of the butte, then slid down it in a hurry, got my rope tied to the saddle, and mounted; and now I was struck with an idea. The Major wanted Indians, but there were not enough of them here to bother the troop with, I would fight these myself. With this rifle of mine and the horse I had under me, I did not think it a big contract to shoot the whole of them or try to. I got my horse down in the ravine, then rode up it. I meant to keep in it if it headed up at the ridge, as I thought it did; then when I had got close enough turn the rifle loose. I had gone up the ravine 600 yards or more and had left the butte away behind me, when I noticed that the ravine ahead of me was about running out. If I kept on I would soon have to ride out in plain sight of the Indians. They were still where I had first seen them. I could still see them; but they evidently had not seen me yet.

I turned now, and going back at a gallop passed the butte, then kept on down in the ravine to where it entered the small timber that fringes the bank of the creek, then got into the timber and kept on to camp; but before I had got there I had to ride out into the open again in order to cross a ravine that I could not cross at the creek.

Going into camp I found every one at supper, or dinner rather—we only ate twice a day when on the march this way. I told the Captain I had his Indians out here waiting for him.

"Are you sure now that they are Indians, and not buffalo?" he asked. "You remember that stampede we had after the buffalo last fall?"

"Yes, sir; but I did not send you after the buffalo. I know an Indian when I see one." This was a slap at the sergeant, who had sent him after the buffalo.

The Indians were not in sight from here, but picking

up his field glass he and I went up on higher ground and I pointed the Indians out to him. He just leveled his glass at them then called out, "Saddle up, and pack up! Do it in a hurry now!"

The saddles were on in a hurry, the men having to leave the rest of their dinner here on the grass. Then leaving the pack train to follow up, we started.

I told the Captain that the column could not take the route I had taken, the ground was too much broken, so he bore off to the left through a lot of chaparral on our side of the creek, going through at as fast a gallop as the bushes would let us. Then after going a mile we turned to the right, and after crossing the creek, he put us on front into line and we went to the ridge at a fast gallop; but the Indians had left.

It was nearly dark, but a few of us scouted to the front but could see nothing of the Indians. Then going back to the nearest point on the creek, we went into camp again for the night, the Major saying that he would hunt up those fellows to-morrow; he knew now where to look for them.

The men were in a bad humor. They had lost half of their supper. I had lost all of mine or thought I had; but the Major sent orders down for the cook to get me mine right away; and while I was eating it the men kept up their growling—they knew what was going to happen when they saw me leave camp to-day. I never was sent anywhere but I found Indians, or their trail, or some other blanked thing. Why did I not fire a shot at the Indians when I saw them, then let them go to Hades and not get the troop out after them? We have not lost any Indians; we lost our supper all right though.

I let them keep at this for a while, then said, "That will do now. Adjourn this debate and hunt your saddles for the night. I don't want to have to hunt a rope and a tree for any of you. I found those Indians because I was sent to find them, and had I not found them when I did they would have found you to-night, and you would have lost part of your horses, if you have not lost any Indians." This settled it, I could run one of those men up to the nearest tree, tie him up to it by the wrists, then report it to the Major when I had got ready to do it. I was senior corporal then, but did far less of this tying up than any non-com. we had did, and these men would obey me far quicker than they would some of the others who were continually tying them up for any thing or nothing.

Next morning, while we remained in camp here, the Major sent a sergeant and detail over to examine the place where the Indians had been. They came back in an hour and reported that there must have been at least thirty Indians there, judging from the trail they had made when leaving, and the men brought back an old broken rawhide lariat and a worn-out pistol holster These the Indians had thrown away; but the sergeant had a new butcher knife and its sheath that had been lost by some of them. The troop going over now started to follow the trail, but after a few miles it ran out, the Indians having split up. They were going in every direction now except toward us. This was done to prevent us from following them; we might have followed any single pony track of course, but it would not lead us anywhere.

We scouted through that country for the next few days, but did not find their camp, although as their chief told me years after this, the camp was only forty miles away.

I thought at the time that these Indians were the Cohattie Comanches. They were about the only Indians that ran loose at all times then, and these had never been on a reservation and did not go on one until two years after this, when this troop of ours shot about one-half of them and drove the rest on a reservation.

Several years after this, when I had become well acquainted with the Comanches and was living with them part of the time, I told the Cohattie chief about this affair, and asked him if he knew anything about it. Yes, he knew all about it. It was he who had been there. He had about thirty of his men out hunting, when one of his scouts saw us going into camp, and riding back to him told him of it. Calling in his men, he brought them behind that ridge, meaning to stop there until after dark, then jump our camp and run off our horses, if he could do nothing else.

"If you had jumped that camp, you would have found a hornets' nest in it," I told him. "We had men enough there to eat you up."

"You had about fifty men," he replied. "I counted you before I left, while you were mounting; and if I had had as many of my men there as you had I would have waited for you behind that ridge, then let you do the charging. But when I saw you start and knew that I had been seen out there, I left. My camp was only two sleeps away, and you might find and destroy it."

When we did destroy it the chief was away on another hunt, that is what saved him.

I told the chief where I had been when I first saw him, and asked him if he had seen me while I was fooling around that ravine trying to get a shot at him. No, the first he saw of me was when I rode out into the open near my camp. Then he waited to see if I had seen him, and seeing us get ready to leave, he concluded I had seen him. So he left then; he could not surprise us now and had not men enough to fight us.

CABIA BLANCO.

Forest & Stream, Nov. 4, 1905, 366

A Friendly Hunt for Indians.

I STARTED on Christmas morning, 1878, from the camp of our cavalry troop on Wolf Creek, sixty miles west of Camp Supply—Fort Supply it is now—in the Indian Territory. I was sent out to hunt up the different bands of Indians who were west of this, hunting. There were no buffalo in the country and these Indians were reported to be starving, and I was told to send all I could find into Camp Supply, where they could get rations, then they could go home.

It was thought that this trip would take me about eighteen days to make, but I managed to string it out to about six weeks before I got home again. I found a band of Comanches on my way home and attached myself to them, making an excuse to our officers that I wanted to see that this chief did go home; any excuse was better than none at all, and mine went. I got no court-martial for disobeying orders, but did get a blowing up from my captain.

I started on this trip with a young northern Cheyenne Indian as a companion, but he deserted me while we were in the cañon of the Canadian River; he was afraid of a big band of Pawnee Indians I was then hunting for. I told him the Pawnees would not molest him while he was in my company, but he still thought they would, so I told him to take the trail home; he was of no use to me anyhow, I would rather go alone.

I had a Springfield rifle and two Colts pistols. I took an extra horse with me instead of a pack mule, the horse would follow and not have to be led or driven. I knew every foot of this country and needed no guide; that was why I had been sent. We first traveled about west, then in a day or two turned southwest. I wanted to send in any Indians I found in this country, then strike the Canadian River up near the Adobe Walls. I expected to find the Pawnees and other Indians up there. We would start each day about sunrise, travel about thirty miles, then go into camp, get our saddles off, stake our horses out and cook supper, then spread down one of our saddle blankets to lie on, covering ourselves with the other two and using the saddles for pillows.

This young Indian spoke very good English for a Cheyenne, and when we had been out several days and were now almost in sight of the Canadian River, we were riding along one afternoon when the Indian, pulling up his horse, said, "Look! Heap antelope over there, you see them?" I saw them now, but had not he called my attention to them I should not have noticed them at all. We were not going in their direction; they were off to our left, on the side of a small hill, or rather a high roll in the prairie, off which the grass had been burned lately leaving a black surface, and I estimated them to be 1,200 yards away.

I had not had my rifle long; our Springfield carbines had lately been taken from us; they did not carry far enough; the Indians had better guns and could get behind sand hills and stand us off. I had given my carbine up when it was called for, without any regret at losing it. I would not give ten cents a dozen for them and use them to shoot with; they might be worth more as scrap iron. I was never quite sure of being able to hit an object smaller than a barn door or a hay stack with it, but with this rifle I could hit what I aimed at.

In the twenty years that I was in the cavalry I had had about all the guns that the Government put out to try us on, about a dozen different ones from first to last. They were continually experimenting with guns—good, bad and worse ones—but they never thought to give us a Marlin or Kennedy, we might hit something with them.

I should have had a .45-90 Marlin of my own long since, but I would not be let carry it; I might hit an Indian with it; I would if he got in my road less than a quarter of a mile away.

The last gun I ever had must have been sent us by mistake; it was the Hotchkiss carbine. While I never tried to split a ball on a knife blade with it (that can be done easier in story books than it can anywhere else), nor did I ever snuff any candles with it (I have done that with a pistol, and so can anyone if they try). I could lie face down at 500 yards and make 23 or 24 out of a possible 25, then repeat it with the next five shots. The target reports of Troop F, Fourth Cavalry, for the year 1884 at Fort Lowell, Arizona, will tell, if they still exist, whether I could or not.

But the antelope are waiting to be shot all this time. I had forgot all about them. I drew my rifle out of its case on my saddle, put a load in it and put the sight up to 1,200 yards. The antelope were not that far off I now thought, but I had found out that the rifle dropped above 500 yards; how much it would drop at a thousand I did not know.

"No good; too far; you can't shoot," the Indian told me.

"You wait, maybe so I can shoot. You look now." I took steady aim, at the whole bunch, of course, then fired. The antelope stood still for a minute then began to run around, and next disappeared across the rise they had been on.

"You shoot one," the Indian says.

"Did I hit him?"

"Yes, me see him. I go get him."

"No, you stay here. I want to see how far; you come when I say come."

I had no tape line but we had been drilled to estimate distances, and I could guess them very closely now. Riding off what I thought was a hundred yards, I might have made it two or three hundred and got through with it sooner, but I wanted to be sure. I called the Indian down, then let him stop there while I rode another hundred, and at the end of the tenth hundred I was still sixty yards from the antelope. I'll allow that sixty for possible errors, I thought, and call it a thousand yards; it is not a foot less.

I had hit the antelope in the flank and the ball had not gone clear through; it had no doubt ranged forward or it would not have killed him so soon, but I had no time now to hunt for it. The river was still several miles away and it was down in a cañon. I might have to hunt an hour for a place to get down to it. I cut off the hind quarters, leaving the skin on. The Indian wanted to take all, but I did not want to overload my pack horse; I might have to jump these horses over rocks to get down to the river. I knew that cañon pretty well now.

"How far you shoot?" the Indian asked.

"Half mile," I told him. That was as near as I could tell him. He knew nothing about feet or yards.

"How far your gun shoot all the time?"

"Two miles, maybe, no more."

It would not, but those Northern Cheyennes had to be kept down where they were now by force. They belonged up in Nebraska and were always trying to get up there again. They had gone only a year ago and we had had to go after them; and I wanted this young fellow to have a high opinion of the distance I could "shoot" if I had to shoot at them again.

We got to the cañon an hour before sunset and struck it not a hundred yards from a place where I could get down into it. The descent was like a giant stairway; there were regular ledges of rocks, each about five feet wide and about two feet above the next one below. We led our horses down, jumping first on each step ourselves, then letting the horse follow. I went first and had the Indian bring up the rear, the pack horse between us. I did not know if he would follow here without being driven, but he did. Getting down on the floor of the cañon we rode about a mile straight across to the river and went into camp along with some men and a wagon. They were down here from Kansas after cottonwood sprouts to plant timber claims. They had a two-horse wagonload of them now, about 5,000 sprouts they said. These sprouts were a foot or two high and not many of them larger than a lead pencil. They grew here in the sandy soil and can be pulled by hand. A thousand could be got off an acre.

I found a few lodges of Cheyennes and gave them their marching orders. I had already turned several bands of Indians that I overtook going west and told them to go into Supply and get chuck-a-way. The Indian ate about half of what venison we had brought with us for his supper, he would most likely have eaten more had we brought more. I told him to eat it all. I did not want it.

He left me the next day and had to depend on his Springfield carbine for his rations on his way home. If he could not do better shooting with it than I could, and I don't think he could, he went home hungry.

Next day we kept on up the river and about noon I met the second white man I had seen since I had left the troop. This man told me where the Pawnees were likely to be found. I had to laugh at the first man I had met. I gave him a bad scare. We saw him early in the forenoon of the day before, we were riding west then across a level prairie when we saw him a mile or more away, coming east.

He saw us, and turning around, went back at a gallop. I wanted to speak to him, so leaving my pack horse and the Indian, I went after him. I rode a horse that was not in the habit of letting cow ponies run away from him. I let him out now and the cow pony might as well stop; he did. The man, seeing that I was going to overtake him, got off his pony and getting behind him threw his Winchester over the saddle. I was going to have a fight. I was about 500 yards from him and pulled up. I began to swing my hat in a circle to my right. "D—a man," I thought, "who can't tell an Indian from a white man fifty feet away. Why don't he go back east and stay there?" Some of these fellows had Indian on the brain and were expecting to meet one or a dozen ten times a day.

The man came from behind his pony now and mounting him started to meet me. "I thought you were Indians," he said, when he came up to me. "Is not your companion an Indian?"

"We both are. He is a Cheyenne, I am a Comanche, but we are not on the warpath now. There are plenty of Indians out here, but most of them are as harmless as we are. Don't run when you see an Indian. It would be labor thrown away on that pony of yours, and you will only let the Indian know that you are afraid of him. Let him come up. It will do no harm, though, if you keep your Winchester where you can get it when he does come up."

Late in the afternoon to-day I saw a smoke rising among a bunch of trees across the river, and as I was now within a few miles of White Deer Creek, there might be Indians here.

I tied my pack horse here, then rode across toward the smoke. There were bushes on that side near the water, and a path had been cut through them lately, but a squaw had not cut it. I knew that. They may be cowboys, I thought, but there were no cattle in this part of the cañon. I followed the path into the camp in among some post oaks. A big fire was burning and a dozen saddles lay about, while every tree had halters, bridles, or lariat hung on it, but not a man was in sight.

"Hello, the camp!" I called out, but got no answer.

"These are no cowboys," I said. "I guess I know what they are. I don't need them," and turning around I got out of that. I had made up my mind now that they were "rustlers," that is, horse and cattle thieves.

I got to White Deer Creek where it falls into the Canadian River, just before dark, and could see the Pawnees' camp-fires ten miles away up this creek. It was too far to go after dark, so I went into camp here, gathered a big lot of dry wood from the drift piles, and got supper after I had started a big fire. I expected to have a visit from those rustlers before morning, but I need not stand guard. My horse would do that and notify me when they came.

I had a hammer-headed sorrel horse which looked as if he hardly knew enough to eat when hungry, but his looks belied him. I never had a more intelligent one. I had been riding him for four years and rode him another year after this, and then turned him in only because I was leaving the troop. I had taught him to do about everything except speak, and he would try to do that sometimes, when I sat in camp talking to him. He and I had put in each winter for the last four years going it alone, as we were doing now. For the first two I had him with me along with a band of Comanches on their hunt. The past two winters we had not sent details out with most of these bands, but our troop had watched them from a central camp, while I had been kept going alone most of the time carrying dispatches or watching the Indians. I was sent because I knew the country, but I need not have gone alone, I could have got as many men and any particular man I asked for, but I would

not have them. I wanted to go alone; then if I took a notion to go where I had not been sent, after I had been where I had been sent, I went there. I had no men to look after and see that they did not get lost.

This horse had a trick that I had not taught him. It was of more use to me, though, than all I had taught him. When in camp this way, I tied him out on fifty feet of rope, taking care that he always could reach me where I slept; and if anything alarmed him he would walk over to me and punch me with his nose, then if I did not get up soon enough to suit him, he would catch some part of my clothes in his teeth and shake me; then when I had got up and said, "All right, Billy," he went to grazing again.

In the daytime, if I wanted to know if everything was all right in camp, I just looked at the horse. If he was quietly grazing everything was all right. If he stood with his ears stuck forward, something was coming. No rustler could get into our camp and he not know it. I would know it soon after he did, and the rustler would know that we knew it as soon as I could reach my rifle. But I slept undisturbed to-night, no rustler came.

The next morning I rode up to the Pawnee camp. The whole tribe was here. A sergeant of our regiment, but who belonged to a different troop from mine, and ten of his men were here as an escort. I had a written order for him telling him to take his Indians home, and gave it to him, then told him about the rustlers' camp, warning him to look out for his horses. He did not, though, and on his way home, when in camp in the cañon fifteen miles from the rustlers' camp, he lost part of his horses and mules. He took his men and a party of Indians the next day, and went where I had told him the camp was. The camp was there all right, but his horses and mules and the rustlers were not, they had left.

Leaving the Pawnees I came down as far as my last night's camp. I had now sent off all the Indians I could find in this upper country. There were just two ranches at that time on the Canadian River in a distance of about 100 miles, and they were eighty miles apart. It is probably thickly settled now; it ought to be, for it is a beautiful country. One of the ranches was just across from the mouth of White Deer Creek. I wondered why the Indians let it stay there. I think I found out why. The men were probably carrying on a trade with the Indians that the Government knew nothing about. I crossed over to his place to take a look at him. He had a general store, most of his goods, though, were of the kind that only an Indian wants, or at least gets. He generally wants the earth.

"Have you any fire water?" I asked.

"No, he dare not sell it here."

I knew that, did I not? I knew it and I also knew that they sold it right along, but I did not say so. I did not want it and hardly ever used it. I would not use it here if it were given to me. I had need to keep my wits about me when out this way. I only asked him to see if he would sell it. Had he any tobacco? Yes, he had plenty of that, and brought out the kind that Indians buy, long, flat plugs of natural leaf; they use it to smoke. A cowboy would not have it; he wants black navy. I got a pound of tobacco for any Indian friends I might meet.

The man began to question me now. He wanted to find out who I was. I might be a spy on him; he seemed to suspect me. I looked to be a cross between a soldier and a cowboy, I wore very little of the uniform, only a blouse and a blue vest. Was I with those Indians up the creek yonder?

"No, sir. I have nothing at all to do with them, just now."

Was I out here on duty, or just hunting?

"A little of both, I have been sent out here to look around, and I also spend some time hunting. I have a sort of a roving commission and can suit myself in what I do."

Was I an officer in the cavalry? He saw that I had a cavalry horse and saddle and probably noticed that I had one too many pistols for an enlisted man. I had two, and that gun in the saddle did not prevent me from being an officer. Most of our men carried a gun when in the field.

"No, sir, I am not. While I would have no particular objection to being one, the War Department has. At present I am only a sergeant. How much do I owe you, sir," I asked him.

"Nothing, sergeant; you are welcome to the tobacco, and I might let you have a bottle of Hostetter's Bitters if you care for it. I have some."

"No, thank you, sir, I don't like them very well." And I left.

These bitters are but little else than whiskey under another name. I had known them since when a boy, about 1852. I had worked for old Dr. Hostetter in the first little laboratory he ever had, on what is now Penn avenue, in Pittsburg. He put out there in a year about as much of them as his successors now put out in two hours. Since then I had drank them in New York, saw them in San Francisco, ran across them in Honolulu, met them again in Valparaiso, Chili, and going ashore at Hobart Town, Tasman's Land, found them there. They had got pretty well around the globe and now they reminded me of home. They had turned up here again on the Canadian River to cure the Indians of chills and fever.

Next morning I kept on down the river, making easy marches each day and camping early. It was the middle of winter, but there is very little winter here unless a norther is blowing; the nights even were not cold.

There were plenty of deer in the cañon here, and when I had got farther down I began to pass through large herds of cattle. They did not belong here, but had been driven in off the prairie to the south of this. The grass had all been burned and they had to be sent in here to keep them from starving. The deer had come in for the same cause. I had plenty of rations and would not shoot deer to feed wolves; I would sooner shoot the wolves. I met them from time to time, the big timber wolf, but he kept out of range, I was at war with him. Late in the afternoon I noticed several Indian lodges about two miles below me; they were the first I had seen since starting to come down, the ones I had met on my way up had obeyed my orders and had gone home.

I was riding through a big bunch of cattle and saw a number of deer among them quietly feeding with the

cows. Getting off my horse I shot two of them, taking care not to hit a cow. The deer were so close to some of the cows that had I not had confidence in my rifle I would not have fired at them. Letting them lie here I kept on down to the Indian camp and found them to be Cheyennes. Had they been Comanches I would not have found these deer where I did, the Comanches would have had them long ago, but these Cheyennes were too lazy to hunt unless they were hungry. I sent them up after the deer; then seeing a ranch just below rode down to it. The ranch was just being built and was the only one in here below the one at White Deer Creek. The men were complaining about the Indians; they did not want them here.

"They won't be here longer than to-morrow morning," I told them. "I'll send them off."

"Did I think I could make them go?"

"I am here to make them go. I don't need to think about it at all. They will go. Don't fret."

I wanted forage for my horses, they had a pile of corn in the ear at the ranch and told me to help myself. I took enough for night and morning, then went up to the Indian camp and told them to go in to-morrow. The head man wanted to wait a day or two and hunt deer, he said.

"No. I told him it is not good. You go in to-morrow, I stop and see."

I knew about how anxious they were to hunt deer, when they let the deer come to camp hunting them. They wanted to stay here and beg beef if they could, if not then steal it. They were not lying awake at night studying how they could get deer; they let the deer get close enough to bite them, then wait for someone else to shoot him.

I camped with the Cheyennes that night. I was a Comanche, but they did not know it. I did not have my feathers on, though I had them with me in a buckskin bag in my saddle pocket; I always carried them. They were about three inches long, each feather half white and half black, the Comanche colors. They were tied with a buckskin string that had some figures on it. A Comanche would look at these if he did not know me, then say, "Wano"—[Bueno]—very good. I was not a counterfeit; I spoke their language, and nearly every Comanche knew me now as Cabia Blanco—White Pony, the name they had given me. The feathers, had I put them on now, would have had the same effect on those Cheyennes that a red rag has on a bull. The Cheyennes and Comanches don't love each other a little bit.

I got the Indians started next morning, then kept on by myself and camped at night just where a trail crosses the valley. It ran north and south and was called Custer's Trail. He may have made it; he was down here more than once. I left the valley on this trail next morning. I meant to go north now and go into Supply. I debated with myself whether to take this trail or keep on south and go on into Reno by way of the Wichita River. I had not been given any orders as to what route I should take going home, and I thought I knew why. The captain probably thought it would not be worth while. If the route he laid out did not suit me I would take my own. He had given me so many orders in the past four years that I had not obeyed but always had a good reason why I did not obey them, that he had about quit giving me orders. He was so kind as to tell me at one time that he might as well give my horse our orders as give it to me.

"Yes, sir, but you generally get your object accomplished if I don't carry out the orders to the letter," I told him. "That, I think, is what we are both here for."

I camped that night on a small creek on the trail and got up next morning to find it snowing hard, and I started to look for timber. I knew where to find it. Just before I had got to it about noon, I saw a smoke rising out of a cañon on my right a mile away, and went for it at a gallop. There would be Indians there. A big band of Comanches was in camp down there, and I was at home now; it might snow now until it got ready to stop. I need not stay out in it.

I got down into the camp, and riding up to the chief's lodge got off my horse, took the rifle off the saddle, piled it on a pack at the lodge door, then taking off my pistols laid them on top of it. I was a friend here and must not go into that lodge with arms on; the squaw would carry them in for me. A squaw now came and took my horses, she would get their saddles off, then stake them out; I need not look after them unless I chose, if I staid here a month.

I looked now to see if the chief had a stick or piece of brush across his door. If he had, he did not want any of the band in here. I would not try to go in, but he would soon get that stick out of the way. It is only a sign that he is at his meals or is busy. He would not keep a stranger out. There was no stick, and pulling the flap aside, I walked into the lodge. The chief was seated on the floor eating his dinner.

"I have come to see my brother," I told him.

"My brother is very welcome. Let him sit down and eat."

I sat down and ate. The chief was going west. He had not got the order.

"I have been to the west as far as the Adobe Walls. There are no buffalo in all that country. I have looked and seen it. But the Great Father has meat for his children at Camp Supply. Let them go there and get it."

He said that he had plenty of meat in camp now, his people were not hungry; they generally were not. If there was nothing else to be got the white man's cattle were here; and if I were to find them killing a beef I would not kill my horse trying to get to them in time to stop them. I might do as they do when they see a friend doing wrong, "look the other way."

The chief did not want to break camp until the weather moderated.

"Any time is good," I told him. "There is plenty of time. I will stop and go in when my brothers go. I am in no hurry."

In a day or two the weather cleared up, then we started and got into Supply in two days. Here the chief got beef on the hoof, he could kill it himself. He got flour also, but no sugar or coffee. I got what I could buy of that for them. The commissary here was an open one, a soldier could buy anything they had here at the cost price without an order. A citizen could buy nothing, and if a

A Friendly Hunt for Indians.

I STARTED on Christmas morning, 1878, from the camp of our cavalry troop on Wolf Creek, sixty miles west of Camp Supply—Fort Supply is now in the Indian Territory. I was sent out to hunt up the different bands of Indians who were west of this, hunting. There were no buffalo in the country and these Indians were reported to be starving, and I was told to send all I could find into Camp Supply, where they could get rations, then they could go home.

It was thought that this trip would take me about eighteen days to make, but I managed to string it out to about six weeks before I got home again. I found a band of Comanches on my way home and attached myself to them, making an excuse to our officers that I wanted to see that this chief did go home; any excuse was better than none at all, and mine went. I got no court-martial for disobeying orders, but did get a blowing up from my captain.

I started on this trip with a young northern Cheyenne Indian as a companion, but he deserted me while we were in the cañon of the Canadian River; he was afraid of a big band of Pawnee Indians I was then hunting for. I told him the Pawnees would not molest him while he was in my company, but he still thought they would, so I told him to take the trail home; he was of no use to me anyhow, I would rather go alone.

I had a Springfield rifle and two Colts pistols. I took an extra horse with me instead of a pack mule, the horse would follow and not have to be led or driven. I knew every foot of this country and needed no guide; that was why I had been sent. We first traveled about west, then in a day or two turned southwest. I wanted to send in any Indians I found in this country, then strike the Canadian River up near the Adobe Walls. I expected to find the Pawnees and other Indians up there. We would start each day about sunrise, travel about thirty miles, then go into camp, get our saddles off, stake our horses out and cook supper, then spread down one of our saddle blankets to lie on, covering ourselves with the other two and using the saddles for pillows.

This young Indian spoke very good English for a Cheyenne, and when we had been out several days and were now almost in sight of the Canadian River, we were riding along one afternoon when the Indian, pulling up his horse, said, "Look! Heap antelope over there, you see them?" I saw them now, but had not he called my attention to them I should not have noticed them at all. We were not going in their direction; they were off to our left, on the side of a small hill, or rather a high roll in the prairie, off which the grass had been burned lately leaving a black surface, and I estimated them to be 1,200 yards away.

I had not had my rifle long; our Springfield carbines had lately been taken from us; they did not carry far enough; the Indians had better guns and could get behind sand hills and stand us off. I had given my carbine up when it was called for, without any regret at losing it. I would not give ten cents a dozen for them and use them to shoot with; they might be worth more as scrap iron. I was never quite sure of being able to hit an object smaller than a barn door or a hay stack with it, but with this rifle I could hit what I aimed at.

In the twenty years that I was in the cavalry I had had about all the guns that the Government put out to try us on, about a dozen different ones from first to last. They were continually experimenting with guns—good, bad and worse ones—but they never thought to give us a Marlin or Kennedy, we might hit something with them.

I should have had a .45-90 Marlin of my own long since, but I would not be let carry it; I might hit an Indian with it; I would if he got in my road less than a quarter of a mile away.

The last gun I ever had must have been sent us by mistake; it was the Hotchkiss carbine. While I never tried to split a ball on a knife blade with it (that can be done easier in story books than it can anywhere else), nor did I ever snuff any candles with it (I have done that with a pistol, and so can anyone if they try). I could lie face down at 500 yards and make 23 or 24 out of a possible 25, then repeat it with the next five shots. The target reports of Troop F, Fourth Cavalry, for the year 1884 at Fort Lowell, Arizona, will tell, if they still exist, whether I could or not.

But the antelope are waiting to be shot all this time. I had forgot all about them. I drew my rifle out of its case on my saddle, put a load in it and put the sight up to 1,200 yards. The antelope were not that far off I now thought, but I had found out that the rifle dropped above 500 yards; how much it would drop at a thousand I did not know.

"No good; too far; you can't shoot," the Indian told me.

"You wait, maybe so I can shoot. You look now." I took steady aim, at the whole bunch, of course, then fired. The antelope stood still for a minute then began to run around, and next disappeared across the rise they had been on.

"You shoot one," the Indian says.

"Did I hit him?"

"Yes, me see him. I go get him."

"No, you stay here. I want to see how far; you come when I say come."

I had no tape line but we had been drilled to estimate distances, and I could guess them very closely now. Riding off what I thought was a hundred yards, I might have made it two or three hundred and got through with it sooner, but I wanted to be sure. I called the Indian down, then let him stop there while I rode another hundred, and at the end of the tenth hundred I was still sixty yards from the antelope. I'll allow that sixty for possible errors, I thought, and call it a thousand yards; it is not a foot less.

I had hit the antelope in the flank and the ball had not gone clear through; it had no doubt ranged forward or it would not have killed him so soon, but I had no time now to hunt for it. The river was still several miles away and it was down in a cañon. I might have to hunt an hour for a place to get down to it. I cut off the hind quarters, leaving the skin on. The Indian wanted to take all, but I did not want to overload my pack horse; I might have to jump these horses over rocks to get down to the river. I knew that cañon pretty well now.

"How far you shoot?" the Indian asked.
"Half mile," I told him. That was as near as I could tell him. He knew nothing about feet or yards.

"How far your gun shoot all the time?"

"Two miles, maybe, no more."
It would not, but those Northern Cheyennes had to be kept down where they were now by force. They belonged up in Nebraska and were always trying to get up there again. They had gone only a year ago and we had had to go after them; and I wanted this young fellow to have a high opinion of the distance I could "shoot" if I had to shoot at them again.

We got to the cañon an hour before sunset and struck it not a hundred yards from a place where I could get down into it. The descent was like a giant stairway; there were regular ledges of rocks, each about five feet wide and about two feet above the next one below. We led our horses down, jumping first on each step ourselves, then letting the horse follow. I went first and had the Indian bring up the rear, the pack horse between us. I did not know if he would follow here without being driven, but he did. Getting down on the floor of the cañon we rode about a mile straight across to the river and went into camp along with some men and a wagon. They were down here from Kansas after cottonwood sprouts to plant timber claims. They had a two-horse wagonload of them now, about 5,000 sprouts they said. These sprouts were a foot or two high and not many of them larger than a lead pencil. They grew here in the sandy soil and can be pulled by hand. A thousand could be got off an acre.

I found a few lodges of Cheyennes and gave them their marching orders. I had already turned several bands of Indians that I overtook going west and told them to go into Supply and get chuck-a-way. The Indian ate about half of what venison we had brought with us for his supper, he would most likely have eaten more had we brought more. I told him to eat it all. I did not want it.

He left me the next day and had to depend on his Springfield carbine for his rations on his way home. If he could not do better shooting with it than I could, and I don't think he could, he went home hungry.

Next day we kept on up the river and about noon I met the second white man I had seen since I had left the troop. This man told me where the Pawnees were likely to be found. I had to laugh at the first man I had met. I gave him a bad scare. We saw him early in the forenoon of the day before, we were riding west then across a level prairie when we saw him a mile or more away, coming east.

He saw us, and turning around, went back at a gallop. I wanted to speak to him, so leaving my pack horse and the Indian, I went after him. I rode a horse that was not in the habit of letting cow ponies run away from him. I let him out now and the cow pony might as well stop; he did. The man, seeing that I was going to overtake him, got off his pony and getting behind him threw his Winchester over the saddle. I was going to have a fight. I was about 500 yards from him and pulled up. I began to swing my hat in a circle to my right. "D— a man," I thought, "who can't tell an Indian from a white man fifty feet away. Why don't he go back east and stay there?" Some of these fellows had Indian on the brain and were expecting to meet one or a dozen ten times a day.

The man came from behind his pony now and mounting him started to meet me. "I thought you were Indians," he said, when he came up to me. "Is not your companion an Indian?"

"We both are. He is a Cheyenne, I am a Comanche, but we are not on the warpath now. There are plenty of Indians out here, but most of them are as harmless as we are. Don't run when you see an Indian. It would be labor thrown away on that pony of yours, and you will only let the Indian know that you are afraid of him. Let him come up. It will do no harm, though, if you keep your Winchester where you can get it when he does come up."

Late in the afternoon to-day I saw a smoke rising among a bunch of trees across the river, and as I was now within a few miles of White Deer Creek, there might be Indians here.

I tied my pack horse here, then rode across toward the smoke. There were bushes on that side near the water, and a path had been cut through them lately, but a squaw had not cut it. I knew that. They may be cowboys, I thought, but there were no cattle in this part of the cañon. I followed the path into the camp in among some post oaks. A big fire was burning and a dozen saddles lay about, while every tree had halters, bridles, or lariats hung on it, but not a man was in sight.

"Hello, the camp!" I called out, but got no answer.

"These are no cowboys," I said. "I guess I know what they are. I don't need them," and turning around I got out of that. I had made up my mind now that they were "rustlers," that is, horse and cattle thieves.

I got to White Deer Creek where it falls into the Canadian River, just before dark, and could see the Pawnees' camp-fires ten miles away up this creek. It was too far to go after dark, so I went into camp here, gathered a big lot of dry wood from the drift piles, and got supper after I had started a big fire. I expected to have a visit from those rustlers before morning, but I need not stand guard. My horse would do that and notify me when they came.

I had a hammer-headed sorrel horse which looked as if he hardly knew enough to eat when hungry, but his looks belied him. I never had a more intelligent one. I had been riding him for four years and rode him another year after this, and then turned him in only because I was leaving the troop. I had taught him to do about everything except speak, and he would try to do that sometimes, when I sat in camp talking to him. He and I had put in each winter for the last four years going it alone, as we were doing now. For the first two I had him with me along with a band of Comanches on their hunt. The past two winters we had not sent details out with most of these bands, but our troop had watched them from a central camp, while I had been kept going alone most of the time carrying dispatches or watching the Indians. I was sent because I knew the country, but I need not have gone alone, I could have got as many men and any particular man I asked for, but I would

not have them. I wanted to go alone; then if I took a notion to go where I had not been sent, after I had been where I had been sent, I went there. I had no men to look after and see that they did not get lost.

This horse had a trick that I had not taught him. It was of more use to me, though, than all I had taught him. When in camp this way, I tied him out on fifty feet of rope, taking care that he always could reach me where I slept; and if anything alarmed him he would walk over to me and punch me with his nose, then if I did not get up soon enough to suit him, he would eat some part of my clothes in his teeth and shake me; then when I had got up and said, "All right, Billy," he went to grazing again.

In the daytime, if I wanted to know if everything was all right in camp, I just looked at the horse. If he was quietly grazing everything was all right. If he stood with his ears stuck forward, something was coming. No rustler could get into our camp and he not know it. I would know it soon after he did, and the rustler would know that we knew it as soon as I could reach my rifle. But I slept undisturbed to-night, no rustler came.

The next morning I rode up to the Pawnee camp. The whole tribe was here. A sergeant of our regiment, but who belonged to a different troop from mine, and ten of his men were here as an escort. I had a written order for him telling him to take his Indians home, and gave it to him, then told him about the rustlers' camp, warning him to look out for his horses. He did not, though, and on his way home, when in camp in the cañon fifteen miles from the rustlers' camp, he lost part of his horses and mules. He took his men and a party of Indians the next day, and went where I had told him the camp was. The camp was there all right, but his horses and mules and the rustlers were not, they had left.

Leaving the Pawnees I came down as far as my last night's camp. I had now sent off all the Indians I could find in this upper country. There were just two ranches at that time on the Canadian River in a distance of about 100 miles, and they were eighty miles apart. It is probably thickly settled now; it ought to be, for it is a beautiful country. One of the ranches was just across from the mouth of White Deer Creek. I wondered why the Indians let it stay there. I think I found out why. The men were probably carrying on a trade with the Indians that the Government knew nothing about. I crossed over to his place to take a look at him. He had a general store, most of his goods, though, were of the kind that only an Indian wants, or at least gets. He generally wants the earth.

"Have you any fire water?" I asked.

"No, he dare not sell it here."

I knew that, did I not? I knew it and I also knew that they sold it right along, but I did not say so. I did not want it and hardly ever used it. I would not use it here if it were given to me. I had need to keep my wits about me when out this way. I only asked him to see if he would sell it. Had he any tobacco? Yes, he had plenty of that, and brought out the kind that Indians buy, long, flat plugs of natural leaf; they use it to smoke. A cowboy would not have it; he wants black navy. I got a pound of tobacco for any Indian friends I might meet.

The man began to question me now. He wanted to find out who I was. I might be a spy on him; he seemed to suspect me. I looked to be a cross between a soldier and a cowboy, I wore very little of the uniform, only a blouse and a blue vest. Was I with those Indians up the creek yonder?

"No, sir. I have nothing at all to do with them, just now."

"Was I out here on duty, or just hunting?"

"A little of both, I have been sent out here to look around, and I also spend some time hunting. I have a sort of a roving commission and can suit myself in what I do."

Was I an officer in the cavalry? He saw that I had a cavalry horse and saddle and probably noticed that I had one too many pistols for an enlisted man. I had two, and that gun in the saddle did not prevent me from being an officer. Most of our men carried a gun when in the field.

"No, sir, I am not. While I would have no particular objection to being one, the War Department has. At present I am only a sergeant. How much do I owe you, sir," I asked him.

"Nothing, sergeant; you are welcome to the tobacco, and I might let you have a bottle of Hostetter's Bitters if you care for it. I have some."

"No, thank you, sir, I don't like them very well." And I left.

These bitters are but little else than whiskey under another name. I had known them since when a boy, about 1852. I had worked for old Dr. Hostetter in the first little laboratory he ever had, on what is now Penn avenue, in Pittsburg. He put out there in a year about as much of them as his successors now put out in two hours. Since then I had drank them in New York, saw them in San Francisco, ran across them in Honolulu, met them again in Valparaiso, Chili, and going ashore at Hobart Town, Tasman's Land, found them there. They had got pretty well around the globe and now they reminded me of home. They had turned up here again on the Canadian River to cure the Indians of chills and fever.

Next morning I kept on down the river, making easy marches each day and camping early. It was the middle of winter, but there is very little winter here unless a norther is blowing; the nights even were not cold.

There were plenty of deer in the cañon here, and when I had got farther down I began to pass through large herds of cattle. They did not belong here, but had been driven in off the prairie to the south of this. The grass had all been burned and they had to be sent in here to keep them from starving. The deer had come in for the same cause. I had plenty of rations and would not shoot deer to feed wolves; I would sooner shoot the wolves. I met them from time to time, the big timber wolf, but he kept out of range, I was at war with him. Late in the afternoon I noticed several Indian lodges about two miles below me; they were the first I had seen since starting to come down, the ones I had met on my way up had obeyed my orders and had gone home.

I was riding through a big bunch of cattle and saw a number of deer among them quietly feeding with the

cows. Getting off my horse I shot two of them, taking care not to hit a cow. The deer were so close to some of the cows that had I not had confidence in my rifle I would not have fired at them. Letting them lie here I kept on down to the Indian camp and found them to be Cheyennes. Had they been Comanches I would not have found these deer where I did, the Comanches would have had them long ago, but these Cheyennes were too lazy to hunt unless they were hungry. I sent them up after the deer; then seeing a ranch just below rode down to it. The ranch was just being built and was the only one in here below the one at White Deer Creek. The men were complaining about the Indians; they did not want them here.

"They won't be here longer than to-morrow morning," I told them. "I'll send them off."

"Did I think I could make them go?"

"I am here to make them go. I don't need to think about it at all. They will go. Don't fret."

I wanted forage for my horses, they had a pile of corn in the ear at the ranch and told me to help myself. I took enough for night and morning, then went up to the Indian camp and told them to go in to-morrow. The head man wanted to wait a day or two and hunt deer, he said.

"No. I told him it is not good. You go in to-morrow, I stop and see."

I knew about how anxious they were to hunt deer, when they let the deer come to camp hunting them. They wanted to stay here and beg beef if they could, if not then steal it. They were not lying awake at night studying how they could get deer; they let the deer get close enough to bite them, then wait for someone else to shoot him.

I camped with the Cheyennes that night. I was a Comanche, but they did not know it. I did not have my feathers on, though I had them with me in a buckskin bag in my saddle pocket; I always carried them. They were about three inches long, each feather half white and half black, the Comanche colors. They were tied with a buckskin string that had some figures on it. A Comanche would look at these if he did not know me, then say, "Wano"—[Bueno]—very good. I was not a counterfeit; I spoke their language, and nearly every Comanche knew me now as Cabia Blanco—White Pony, the name they had given me. The feathers, had I put them on now, would have had the same effect on those Cheyennes that a red rag has on a bull. The Cheyennes and Comanches don't love each other a little bit.

I got the Indians started next morning, then kept on by myself and camped at night just where a trail crosses the valley. It ran north and south and was called Custer's Trail. He may have made it; he was down here more than once. I left the valley on this trail next morning. I meant to go north now and go into Supply. I debated with myself whether to take this trail or keep on south and go on into Reno by way of the Wichita River. I had not been given any orders as to what route I should take going home, and I thought I knew why. The captain probably thought it would not be worth while. If the route he laid out did not suit me I would take my own. He had given me so many orders in the past four years that I had not obeyed but always had a good reason why I did not obey them, that he had about quit giving me orders. He was so kind as to tell me at one time that he might as well give my horse our orders as give it to me.

"Yes, sir, but you generally get your object accomplished if I don't carry out the orders to the letter," I told him. "That, I think, is what we are both here for."

I camped that night on a small creek on the trail and got up next morning to find it snowing hard, and I started to look for timber. I knew where to find it. Just before I had got to it about noon, I saw a smoke rising out of a cañon on my right a mile away, and went for it at a gallop. There would be Indians there. A big band of Comanches was in camp down there, and I was at home now; it might snow now until it got ready to stop. I need not stay out in it.

I got down into the camp, and riding up to the chief's lodge got off my horse, took the rifle off the saddle, piled it on a pack at the lodge door, then taking off my pistols laid them on top of it. I was a friend here and must not go into that lodge with arms on; the squaw would carry them in for me. A squaw now came and took my horses, she would get their saddles off, then stake them out; I need not look after them unless I chose, if I staid here a month.

I looked now to see if the chief had a stick or piece of brush across his door. If he had, he did not want any of the band in here. I would not try to go in, but he would soon get that stick out of the way. It is only a sign that he is at his meals or is busy. He would not keep a stranger out. There was no stick, and pulling the flap aside, I walked into the lodge. The chief was seated on the floor eating his dinner.

"I have come to see my brother," I told him.

"My brother is very welcome. Let him sit down and eat."

I sat down and ate. The chief was going west. He had not got the order.

"I have been to the west as far as the Adobe Walls. There are no buffalo in all that country. I have looked and seen it. But the Great Father has meat for his children at Camp Supply. Let them go there and get it."

He said that he had plenty of meat in camp now, his people were not hungry; they generally were not. If there was nothing else to be got the white man's cattle were here; and if I were to find them killing a beef I would not kill my horse trying to get to them in time to stop them. I might do as they do when they see a friend doing wrong, "look the other way."

The chief did not want to break camp until the weather moderated.

"Any time is good," I told him. "There is plenty of time. I will stop and go in when my brothers go. I am in no hurry."

In a day or two the weather cleared up, then we started and got into Supply in two days. Here the chief got beef on the hoof, he could kill it himself. He got flour also, but no sugar or coffee. I got what I could buy of that for them. The commissary here was an open one, a soldier could buy anything they had here at the cost price without an order. A citizen could buy nothing, and if a

soldier were caught buying anything for a citizen he would be court-martialed; but there was no law to prevent me from buying stuff and giving it to these Indians. That commissary officer certainly knew that I did not want fifty pounds of coffee and 150 pounds of sugar for myself. I might have drawn all the rations I wanted for myself here on my traveling order, a paper I carried to tell who I was and what I was doing out here alone; but Troop I of ours was stationed here and they piled all the rations and forage on my pack horse that I would take on him.

We pulled out again now, and two short marches (we were in no hurry now, or else one march would have done it), took us to a big turkey roost called Sheridan's Roost. Here we went into camp and the chief proposed to stop here and hunt turkeys. He had an old muzzle-loading shotgun that looked as if it had been new about the year 1800, but it must have left a blacksmith shop. I think that is where it had been made, the maker had forgot to put his name on it. Later than that, as it was a percussion lock, it had been probably given to the chief by some white man to get rid of the gun and the chief at the same time. The stock had been broken and mended with rawhide.

I went after turkeys with a rifle and got two in a small park by creeping up on them through the brush to where they were feeding. We kept on next day and at last got to Fort Reno, and went into camp across the river from the post. Then I and the chief went over to see the commanding officer, the chief to beg chuckaway (anything that can be eaten is chuckaway) while I wanted to report my return.

I should have done that to my captain, but had an idea that if I reported to this commanding officer here he would tell me to get these Indians out of this, they were not wanted here. That is what he did tell me, and his orders went, he ranked the captain. He said I seemed to be able to do more with these Comanches than some others could, for me to go home with them and see that they got there in some reasonable time. He did not want them ranging all over the country, he said. I took them to their reservation now, taking our time about going to it also. Then we held a dance to celebrate our safe return home again.

I could not strike up any more excuses to keep me out here longer now; I had about exhausted them all, so I went home to Fort Reno and reported to the captain and got a blowing up from him. He wanted to know if I thought that when he sent me out last Christmas he had sent me to stay all summer.

CABIA BLANCO.

Touring the

If you would hear of touring you must apologize, for the A with all the mas border is studded less forest. The West are wild Nevada is new lures the trav lights him as of Southern their myriad man who le far from ci cannot ava and think

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it on his scalp, then giving it a jerk, brought it off and swinging it around his head, brought it down on the dead Indian's face and was about to mutilate him after a custom that these Tonkawas had when I stopped that. The scalping only delayed us a minute, and then we kept on out in the direction the other Indian had taken. I knew he had been hit and could not go very far. He would probably be found lying out in the bushes somewhere waiting for a chance to shoot one of us before he took his departure for the happy hunting grounds. Although both of us were looking for him, we did not see him until we had passed him; then he fired a shot at us out of some bushes he was lying in. Anderson and I dropping flat on the ground now, opened fire on the bushes, but after we had wasted half a dozen shots, getting no reply, we went to them and found the man dead. He had only been hit once, when climbing the hill; all the shots we had sent in here had been misses, the ball that killed him had gone clear through his body. I wondered how he had lived to get this far. This was another Kiowa. His tribe seemed to be on the warpath to-day. This was no doubt the one who had tried to put me off it. He had a Colt's pistol so tightly clasped in his right hand that I had to twist it around to get it. This pistol, a powder and ball Colt's just like mine, was empty; he had fired his last shot, and had no more to load with. The cowboy he had stolen this pistol from had cut his initials, "J. A." in the stock; had he added the B., they would have been my initials. I added it and carried the pistol, for I wanted two. Anderson dragged the Indian out of the bushes now, then asked if I wanted to scalp this one.

"No," I told him, "if I did and the Major heard of it I would walk and lead my horse for the next week. You can scalp him."

Just now the trumpet in camp half a mile away sounded the recall. The captain had got into camp but had to hunt a trumpeter next; the boy was out after Indians like the rest of us; he shot two, or said he did. Maybe he did, for others were shot as we afterward found out. A month after this some cowboys told me that they had found the bodies of three more dead Indians several miles from the scene of the engagement. When the Indians were coming down here they passed within thirty yards of the captain and doctor but never saw them, the Indians being up on the bank while the officers were below the bank fishing. Had they been seen there would have been vacancies for a captain and assistant surgeon in the army in the next few minutes.

We rode all over this country as long as we had any light to see by, but I saw no more Indians, nor did we see any of these afterward, the few that escaped alive walked home. I did not know then what this battle would be called, or whether it would be called anything or not, but nearly four years after this, when I had my next discharge handed me, I turned to the back of it to see if I had been credited with the correct number of Indian engagements and found that I had been in the fight of Hubbard's Creek, Tex., April 3, 1870. These Indians had taken us to be a party of cowboys when they first saw our camp. Had they known who we were, they would not have come within a mile of us. Some of us did look as much like cowboys as anything else.

We kept on hunting Indians, and after a day or two, when we were sure that those we had hunted last had gone home, we headed west. The captain meant to go as far as the Mountain Pass country where the Cohatties had had me corralled a few years before this at the time they chased me, and a day or two after we had turned west, while riding across the prairie one afternoon, a small black bear was seen making quick time across the prairie going south. He had been on the trail we were now on, and had just seen us.

I got permission to follow him. Anderson, who had not asked any permission, was already after him. The prairie was as level as a barn floor, just the place to run a bear or anything else on. The bear had 600 yards the start of us, and he kept it for the next mile, too. Any man who has seen the black bears in a menagerie and thinks that the clumsy animal cannot run need only to try to catch one of them when the bear is in a hurry to go home, to find out his mistake.

I rode a horse that would never be mistaken for a cart horse, I had run buffalo with him, and Anderson had a good pony. I passed Anderson at the end of a mile and he pulled up and stopped; but I kept on and at the end of another mile ran the bear down and shot him. Anderson came up while I was examining the bear and said:

"Mebbe so some Comanches go that way to-day," pointing west. "I see heap trail back there." That was what he had stopped for.

"How many are there?" I asked.

"Mebbe so ten ponies and a heap cows."

Jumping on my horse I said: "Come and tell the major about it right away."

I would lose my bear; I might as well have let him go; I never saw him again. We took a course across the prairie that would bring us out on the trail the troop was on, and when crossing the Comanche trail I saw it plain now. Had I not been too busy trying to overtake the bear I might have seen it when Anderson did. We came up with the troop just as they had turned off to go into camp, and reported the Indians.

Getting over on their trail we followed it mounted until dark, then on foot, leading our horses all night, going now at the rate of a mile an hour while the scouts felt for the trail.

Feeling for it just describes it. The scouts would have to get down on their knees every once in a while to see whether they were on the trail or not. Just at daylight we came across one of the Indians seated alongside the trail holding his pony and fast asleep. He had been left here on picket and had gone asleep on post.

A Tonkawa shot him, using his gun to do it with. Had he used his bow or a knife we might have got all his party, as it was he was the only one we did get. His friends who had halted below here, taking the alarm dropped their cows and left. We mounted and charged across a wet bottom after them; but their ponies had all the advantage here; they could cross this swamp anywhere, while our heavy horses would have to hunt solid

ground, and when we found it the Indians were out of sight. We might kill our horses now and not overtake them. Whether any of the balls we sent after them reached them we never knew. I do know, though, that on their account I was out a bear skin. Some coyote got it; he did not go after it, though, before he was certain that the bear was dead.

CABIA BLANCO.

Cabia Blanco.

Editor Forest and Stream:

It was with sincere regret that I read that Cabia Blanco is dead. His tales of adventure in the old West were full of touches and grips which brought one next to the wide open lands. When he, a real outdoor man, spoke, it was to tell some fact unfretted by conventional theory or notion. His calm narrative of the pedantic Easterner who wanted the scientific names for everything, and how gladly he helped the tenderfoot to an ample supply of "hog Latin" cognomens was one of the funniest things I ever read. Coahoma's phrase, "the air of verity pervading" Cabia Blanco's writings strikes the keynote of the tales. In every one of these stories one finds groupings of words which any writer might envy. In "My First Black Bear" he says of his Indian boy friend:

"He taught me to handle and ride their ponies, and when we got to the buffalo country, taught me to kill buffalo."

There is nothing better than that anywhere. Every paragraph he wrote has a sentence like this one, running over with hints of things untold, but telling all that should be told at the time.

No one with the love of nature in his heart could do otherwise than rejoice in the kindly heart which shows through Cabia Blanco's Indians. "The chief gave our horses a critical examination. Had he not been a Crow I should have been right at his heels lest one of these horses might get stuck to his fingers; but I did not go near him." "When I took charge of these two team horses I began to make pets of them right away. They had no names. I named one John and the other Charley. They soon knew their names and would answer to them." In his pocket was always something good for his "pet," and his pen wrote only kindly words. The good humored tolerance for his officers is shown in countless naive sayings.

Such a surprising variety of experiences were described or hinted at in his stories. In a sentence or two, an aside in "another story," he reveals the fact that Cabia Blanco is no mere nom de plume, but one bestowed by one of the tribes of Indians whom he had met somewhere in the Louisiana Purchase.

What a pleasure it is to turn back and read the stories Cabia Blanco wrote for us. They are the real thing. He was no mere onlooker. He made those long rides himself, not thinking that they were for publication. He loved them for themselves, and remembered his Indians, his tenderfeet, his buffaloes, his horses and his rifles because they were all true friends, each one of whom had given him a delight—something it was not in Cabia Blanco's heart to forget.

RAYMOND S. SPEARS.

LITTLE FALLS, N. Y.

Hunting Bears and Indians.

On April 3, 1870, our troop was sent out from Fort Griffin—it is now the town of Griffin—Texas, to scout southeast of it and hunt for any stray Indians that might have come down from the Territory on a horse-stealing expedition. We had not long to hunt for them, we found them; or rather they found us, a few hours after we had started to look for them. The Indians would walk down here, bringing bridles; then when they had got horses they would ride back again. That is, they sometimes did; but not if we found them before they had found the horses.

We camped this afternoon on Hubbard's Creek, only a few miles from the fort, and soon after camp was made, the captain and surgeon went off up the creek to fish, taking no arms with them. It was the last time that either of them ever went fishing without arms.

The camp had been made on the second bottom, a wide flat place above the creek, which had on it a number of mesquite bushes, and our horses were tied out on grass among the bushes. About an hour before sunset, while I was out at my horse changing him on fresh grass, I happened to look off to my right, where a low bank led up to the prairie beyond, and noticed several Indians on foot coming down the bank as if they were in no hurry to get down.

It never for a moment occurred to me that they were hostile Indians. We had several of our Tonkawa scouts with us, and I took these Indians to be some of them; the deliberate way that they were coming made me think so, but not for long. One of them fired at me, the ball just going above my head, and now I knew who they were. I had about thirty yards to go to get to my saddle, and it took me just about thirty seconds to get there. Picking up my carbine, I slung the little leather pouch that held my cartridges over my shoulder and ran out among the horses again. A young Tonkawa boy, named Anderson, a pet of mine, overtook me. He had his carbine but no cartridges and I gave him some of mine.

No Indians were in sight here now. If they were down in the bottom, the bushes hid them, and we could not fire here anyhow, for our horses were in the road. Our men were stringing out now, each man by himself; but none of them came where we were.

Just now two Indians ran out from among the horses and started to climb up the bank in front of us. Anderson and I both fired and one of them dropped; the other kept on. We fired again and the second one fell, got up, and was out of sight before we could shoot again. Going up to where the first one lay we found that both of us had hit him and he was as dead now as he ever would be; and Anderson proceeded to scalp him. I saw that this one was a Kiowa; had he been a Comanche I would have stopped Anderson; I was supposed to do it anyhow, but did not want to interfere with any of these Indians' customs, not in the present case.

This was not the red brother who had been shooting at me, this one had only a bow and arrows on him. Anderson seized hold of his scalp lock, cut a circle around

Mexico

1884-1931

ANTIQUITIES IN MEXICO.

By S. B. EVANS.

The town of Tezcoco in Mexico, though uninteresting in general appearance, contains within its limits and vicinity several large mounds, one of which is reputed to be the site of the palace of Nezahuyucatl, and upon it is a female chapel. An Indian is the owner of one of the *tloletes* or mounds and in leveling the base or lower terrace on the western side, for the purpose of increasing the area of his kitchen garden, he recently encountered a large stone which interfered with his plans and set him to work clearing off another portion of the mound. Hearing of this stone, and obtaining permission to lift it from its resting place, I found it to be a section of an ancient monument of porphyry, sculptured in bas-relief. It is 8 feet in length and 6 feet 9 inches at the greatest diameter, the sculpture representing a colossal human figure, a portion of which is visible on this fragment. It appears that it was broken off at the neck and divided down the trunk to the hips, leaving intact the left side, the arm, and a calendar beneath the arm 2 feet in diameter. The left hand is shown with palm turned inward. The calendar, which is near 6 feet in circumference, is provided with an index, which points to a certain place on the dial, indicating probably the time of the dedication of the monument. The surface of this stone shows marks of violence, as is indicated in the drawing (Fig. 1), given on the following page.

There is a gorget on the neck, a decoration on the breast, and hieroglyphics on the arm, representing, according to Mexican authority, phases of the moon. Upon the index of its calendar is a well-defined Maltese cross. The pedestal of this monument was perhaps in the temple, built on the summit of this mound, from which it was hurled by the Spaniards at the time of the conquest.

The mound was about 60 feet in height and had three terraces or stages, traces of which are to-day plainly perceptible.

It is probable that the Tezcoconians whom Cortez found here were the sculptors of this monument. They, as well as the Aztecs of Mexico, were but a wandering tribe of barbarians three hundred years previous to the advent of the Spaniards. They entered the valley in the begin-

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ning of the thirteenth century and settled on the eastern border of the lake opposite Mexico. The descendants of these people live in the vicinity of Tezcoco to-day and for three hundred and sixty years have been in contact with European civilization without having acquired much knowledge of civilized arts. They are still the Indians whose highest works of art are the feathered pictures which their ancestors made at the time of the invasion.

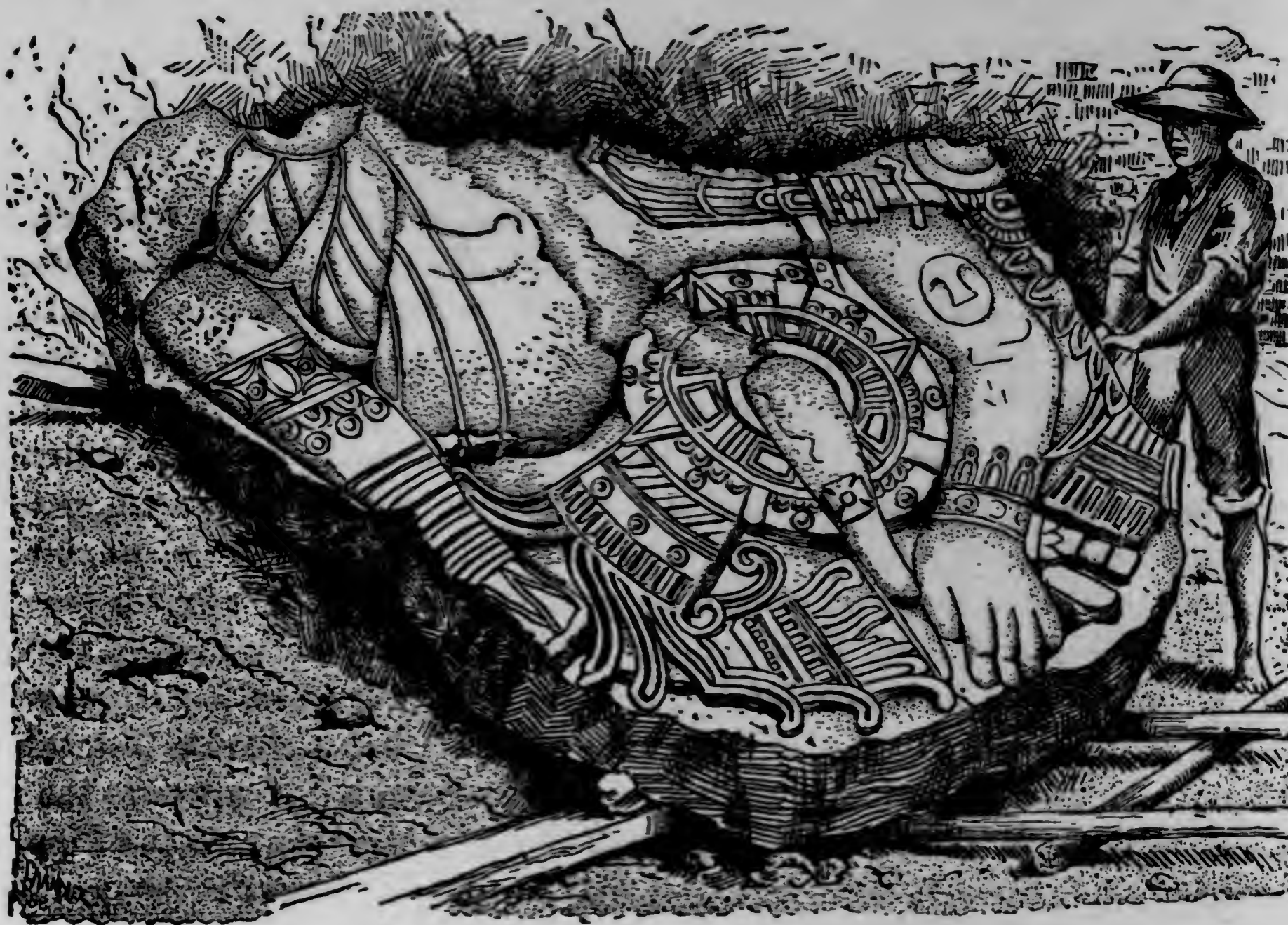


FIG. 1.—Fragment of sculptured porphyry.

If these Indians, whom Cortez found in possession of the soil, were not the authors of these monuments, who did make them? It is quite the fashion to ascribe to the Toltecs everything which is not understood and about which there is a doubt; but there is a grave doubt as to the Toltecs themselves and as to the time when they occupied this valley. It is certain however as to the date of occupation of the Aztecs. It is certain, too, that Tenochtitlon or Mexico was their highest achievement in art or architecture, and Mexico at the time of the conquest, instead of being such a city as Prescott pictures it, was but a collection of mud houses. There were no palaces and there are no remains of palaces in the city of Mexico. Wearied with wandering, the Aztecs finding the remains of a civilization adapted themselves to it the best they could, adopting the idols and blending the religion of the people who preceded them with their own rude idolatry. This is perhaps the cause of the strange contradictions in Aztec remains. In no other way can we account for the defacement of the so-called sacrificial stone by the cutting of a rude channel through its finely sculptured

surface, in which the blood of victims flowed in honor of the fierce Aztec deities. The same theory will also account for the presence of such a work of art as the sculptured slab of Tezcoco in the midst of a collection of mud huts, such as Cortez found and dignified with the name of a city.

The drawing of this "find" (represented in the foregoing figure), was made by Mr. W. H. Bishop, and the following is the translation of the certificate of discovery issued to me by citizen Eugenie Villadosola, political chief of the district of Tezcoco, in the State of Mexico, June 3, 1882:

I certify that Señor S. B. Evans, chief of the expedition sent by the director of the newspaper called the Chicago Times, has presented himself in this town for the purpose of examining the ancient monuments that exist in this district which is under my direction, and having discovered in an excavation that had already been begun a stone that is said to be the ancient calendar stone of Tezcoco, the dimensions and drawings of which he has in his possession, I hereby issue to said Señor Evans this certificate of discovery this 5th day of June, 1882.

EUGENIE VILLADOSOLA,
Political Chief.

ANTONY CÆSAR,
Clerk.

The monument, by order of Señor Mendoza (since deceased), director of the national museum at Mexico, has been removed to the city.

*Am. Anthropologist. Vol. 33, No. 1.
March 1931.*

ANTHROPOLOGICAL NOTES AND NEWS

CODEx VINDOBONENSIS MEXIC. I.

When Walter Lehmann undertook the grouping of the Mexican hieroglyphic manuscripts, in particular of those of the Mixteko-Zapotekic group, in the *Journal de la Société des Américanistes de Paris* (pp. 421 ff.) in 1905, putting the Codex Vindobonensis Mexic. I at the head of group II, "Les peintures Zapotèques," next to its nearest kindred, the Codex Nuttall at the British Museum, he did not fail to add the wish which often had been repeated before and after him: "Espérons, qu'une reproduction comparable à celle que nous devons à la générosité du duc de Loubat, rendra bientôt accessible au public intéressé ce précieux document!"

The authorities of the former Imperial Library at Vienna had indeed intended to reproduce at last in facsimiles this codex, which had been appreciated by them as well as by all scholars as a special cimelium in the series of cimeliums of the "Monumenta Palaeographica Vindobonensia," opened in 1910. This plan was, however, rather put back by the hard war and postwar times. But already in 1925, the art-establishment of Max Jaffé at Vienna undertook, in conjunction with the authorities of the National Library, to publish perfectly faithful facsimiles of the Codex Vindobonensis, without any support on the part of a Maecenas on so great a scale, as the Duke of Loubat was, and in spite of the bad conditions which were much more unfavorable than those of pre-war times. They did it with the intention of making the acquaintance with one of the most important monuments of Ancient Mexican culture possible to all students of this province, and of thus giving important support to the difficult task of deciphering these rare remnants of the culture of the American Middle-Ages, or, to be more exact, Antiquity—last not least in the expectation of finding due understanding for their enterprise in the circles interested in it.

The Codex Vindobonensis is given a particular charm by its marvellous adventures, which, in themselves, prove the high degree of appreciation it met with through all the periods of its existence. Brought to Europe in 1519 as a gift to the Emperor Charles V from Cortez, the manuscript passed through the collections of famous princes and well known bibliophiles, finding at last a permanent home and extraordinary appreciation in the Imperial Library in the seventies of the 17th century.

Seler thought its home to have been in the country of the Totonaks, a question still waiting for conclusive examination and strict delimitation. In spite of the peculiarities it owns, which are characteristic of all similar manuscripts of this group, it also shows some more or less loose relations to the Mixteko-Zapotekic hieroglyphs, to the Seldenmanuscripts of the Bodleian Library at Oxford, to the manuscripts of the Cuicatekic group (according to Lehmann) represented by the codices "Porfirio Diaz" and "Fernandez Leal"; even the manuscripts of the Codex Borgia group may be brought in connexion with it, although they differ

in certain respects, when compared to the group of the Codex Vindobonensis with its complicated astronomic balancing-accounts and other peculiarities of this kind.

The analysis of all the single elements of these connexions, the yet unsolved problem concerning the contents of the Codex Vindobonensis Mexic. I, which, according to the examinations made up to the present, has to pass for a merely astronomical one, and the commentation upon the manuscript, as well as the tables which are intended to facilitate the deciphering, are offered in concise form by Walter Lehmann's preface.

ARCHAEOLOGICAL SURVEY OF EASTERN COLORADO

Under the auspices of the Smithsonian Institution of Washington, the University of Denver, and the Colorado Museum of Natural History, the first archaeological survey of Eastern Colorado was undertaken last summer. The staff comprised: Dr. E. B. Renaud, Professor of Anthropology, as Director, Paul Beaubien, as chief assistant, Dale King, Rex Long, and Charles Steen, as field assistants (all graduates, excepting the latter, a senior, in anthropology from the University of Denver). The whole staff was actively engaged in field work from June 6 to August 15th, or ten weeks, and since then the Director has taken several trips to finish up the work. The territory covered extends from the Rockies in the west to the Kansas line in the east and from Nebraska and Wyoming in the north to the Oklahoma and New Mexico borders in the south, thus connecting with the work done last summer by Dr. Renaud in the Cimarron valley. The expedition covered over 10000 miles, recorded more than 250 Indian sites, and collected about 1000 pounds of flaked stone artifacts without counting bulkier metates, manos, and pounders. This material will be studied during the fall and winter months and a report of the results of this survey will be published later by the University of Denver, together with an archaeological map of Eastern Colorado. A study will be made of the types of artifacts and of their distribution as well as of the materials employed in their making. Thus it appears already that petrified wood from the Black Forest was mostly used in the central highlands of the region, quartzite of a variety of colors in two centers of frequency, one the S.E. corner of Colorado, near Oklahoma, and the other in the N.W. districts near Wyoming, while flint was more common in the north and a black, slaty material was generally employed in most of the S.W. portion of the area. A special chapter will be devoted to the pictographs seen on the boulders and cliffs of the southern canyons and western foothills.

This survey is, by necessity, somewhat sketchy, as the territory to be visited was enormous for such a small staff and a short time. However, it may contribute some valuable knowledge as it is pioneer work in that field. The archaeological survey of Eastern Colorado will connect on the one hand with other surveys undertaken from Nebraska eastward and on the other hand with those of New Mexico and Arizona in the Southwest, and this may add to its significance and usefulness.

fp, Furrow-plate.
A, Suspensory process of fulcrum.
ga, Gland-bristles.
h, Hypopharynx.
ib, Inferior labellar band.
if, Inferior labellar fork.
lg, Labellar glands.
lm, Muscles of labrum.
lp, Inferior labial plate.
me, Extensor muscles.
mp, Medi-proboscis.
mr, Retractor muscles.
mf, Muscle of fulcrum.
mt, Maxillary tendon.
n, Nerve.
nc, Nutritive canal.

o, Maxilla (oberlippe).
of, Upper plate of floor of fulcrum.
op, Upper labial plate.
pr, Palp-bearing ridge.
ps, Pseudo-tracheæ.
sb, Superior labellar band.
sc, Small capsule.
sd, Salivary duct.
sf, Superior fork.
sr, Supporting rods.
t, Teeth.
tg, Tactile ganglion.
th, Tactile hairs.
up, Under plate of floor of fulcrum.
x, Cross-ridge near top of basi-proboscis.

OBER'S TRAVELS IN MEXICO.¹—In point of interest to the public and as a contribution to popular geography this book should meet with favor. To the naturalist desirous of learning something of the physical features of the vast country here described, and of its more prominent biological and ethnological characteristics, Mr. Ober has done a favor.

The work is divided into three books, devoted to Yucatan,



Aboriginals of Mexico.

Central and Southern Mexico, and the border States next to the United States, so it will be seen that the author covers a large extent of ground, indeed, the number of miles traveled (nearly a

¹ *Travels in Mexico and Life among the Mexicans.* By FREDERICK A. OBER. With 190 illustrations. Boston, Estes & Lauriat. 8vo, pp. 672.

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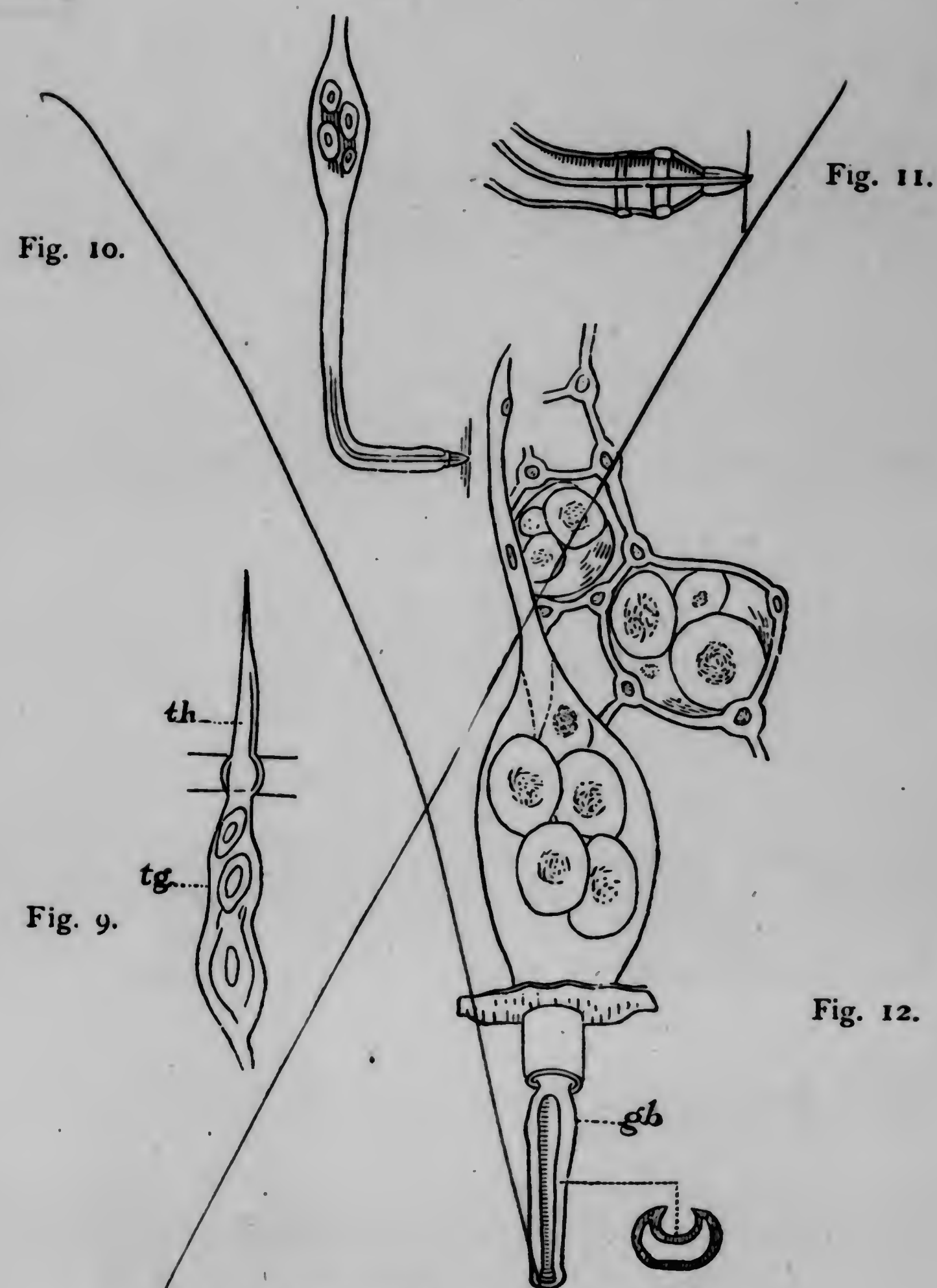
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EXPLANATIONS OF THE FIGURES.

- FIG. 1.—Median section of Fig. 1.
 FIG. 2.—Transverse section of medi-proboscis.
 FIG. 3.—Head of *Musca vomitoria*, with extended proboscis. Side view (left).
 FIG. 4.—Basi-proboscis with part of medi-proboscis, with the covering membrane removed (including part of Kraepelin's Fig. 3).
 FIG. 5.—Transverse sections of basi-proboscis and fulcrum.
 FIG. 6.—Supporting parts of disti-proboscis.
 FIG. 7.—Disti-proboscis, with pseudo-tracheæ.
 FIG. 8.—Longitudinal section of disti-proboscis.
 FIG. 9.—Tactile hair.
 FIGS. 10, 11.—Taste organs.
 FIG. 12.—Dermal glands with gland-bristle and its cross-section.

REFERENCE LETTERS.

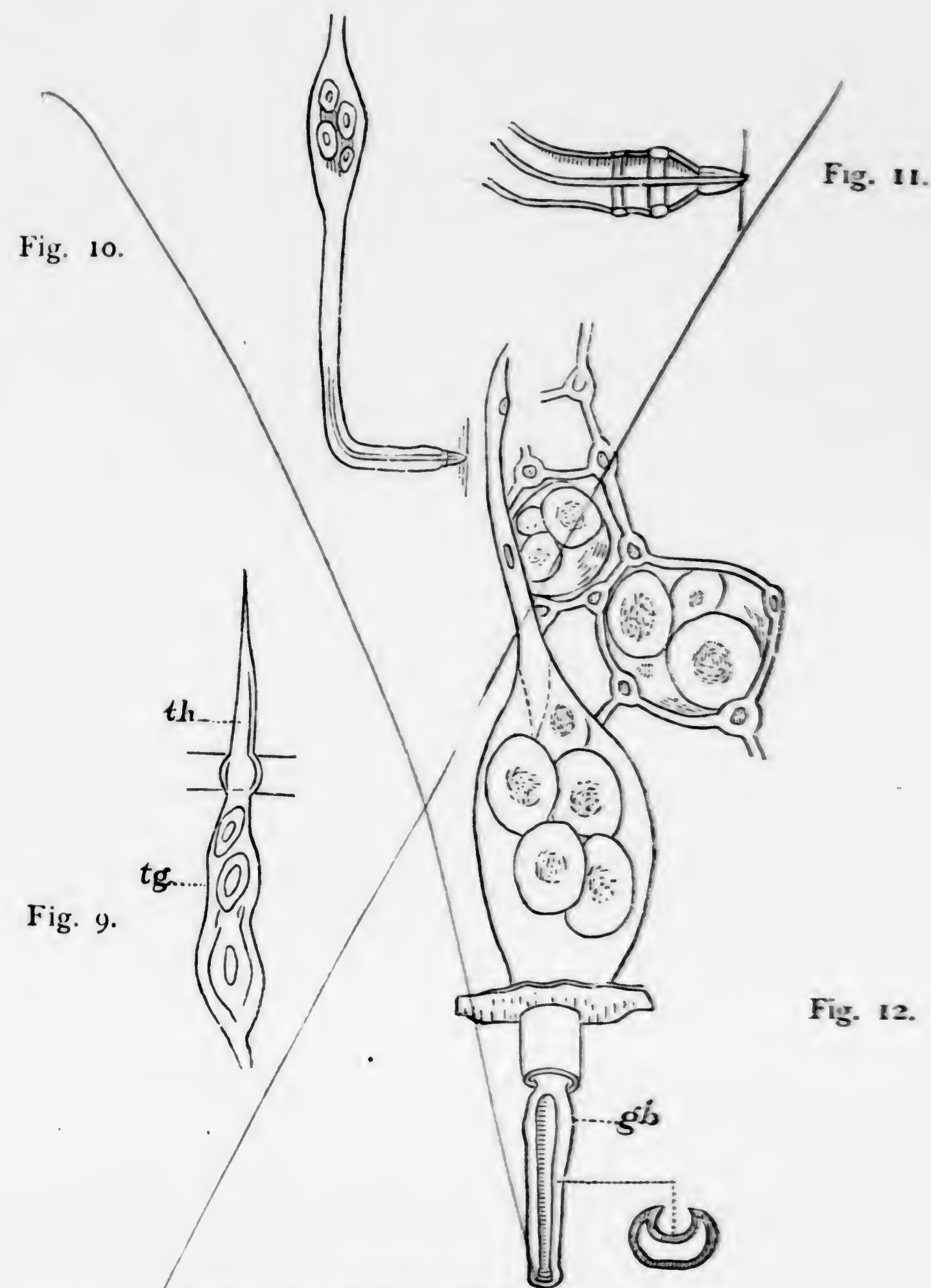
(For all the figures.)

- | | |
|--|-------------------------------|
| b, Crainal bladder. | cb, Band on front of cranium. |
| bp, Basi-proboscis. | dp, Disti-proboscis. |
| c, Cranium. | e, Eye. |
| ca, Chitin-arch supporting pseudo-tracheæ. | f, Fulcrum. |

PLATE XXXVII.



Donkey Boys of Guaymas, Gulf of California.



EXPLANATIONS OF THE FIGURES.

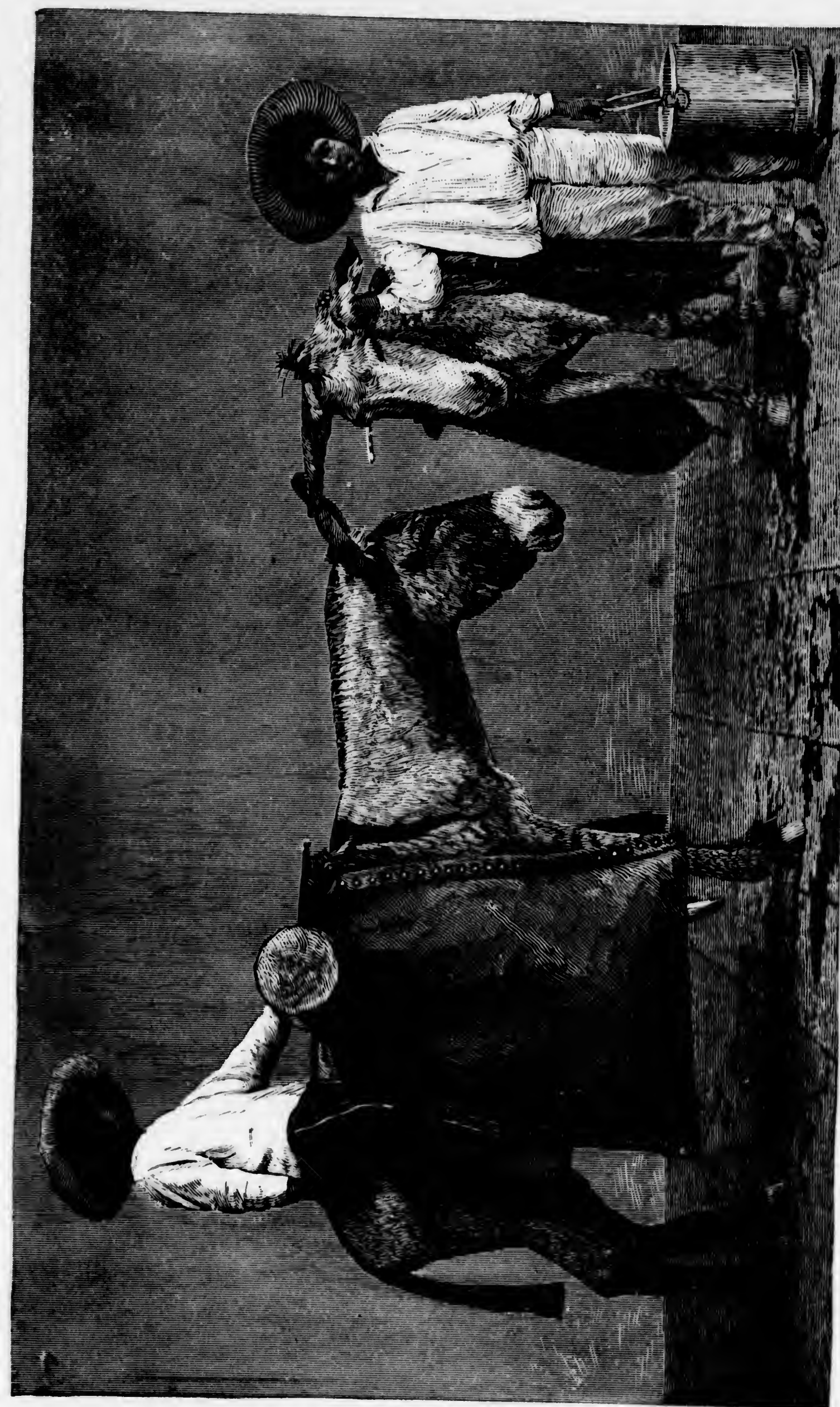
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PLATE XXXVII.



Donkey Boys of Guaymas, Gulf of California.

Retake of Preceding Frame

thousand on horseback) exceeded 10,000, and although he usually went over the routes traveled by the diligence, steamer or railroad, Mr. Ober kept his eyes open and records his experience in a graphic, pleasing way, and the illustrations, which are passably good, add to the attractiveness of the narrative.

On his way to Uxmal, which is briefly described and well illustrated, Mr. Ober visited the water caves of Yucatan, which he thus describes:

"An hour after leaving this hacienda we reached that of



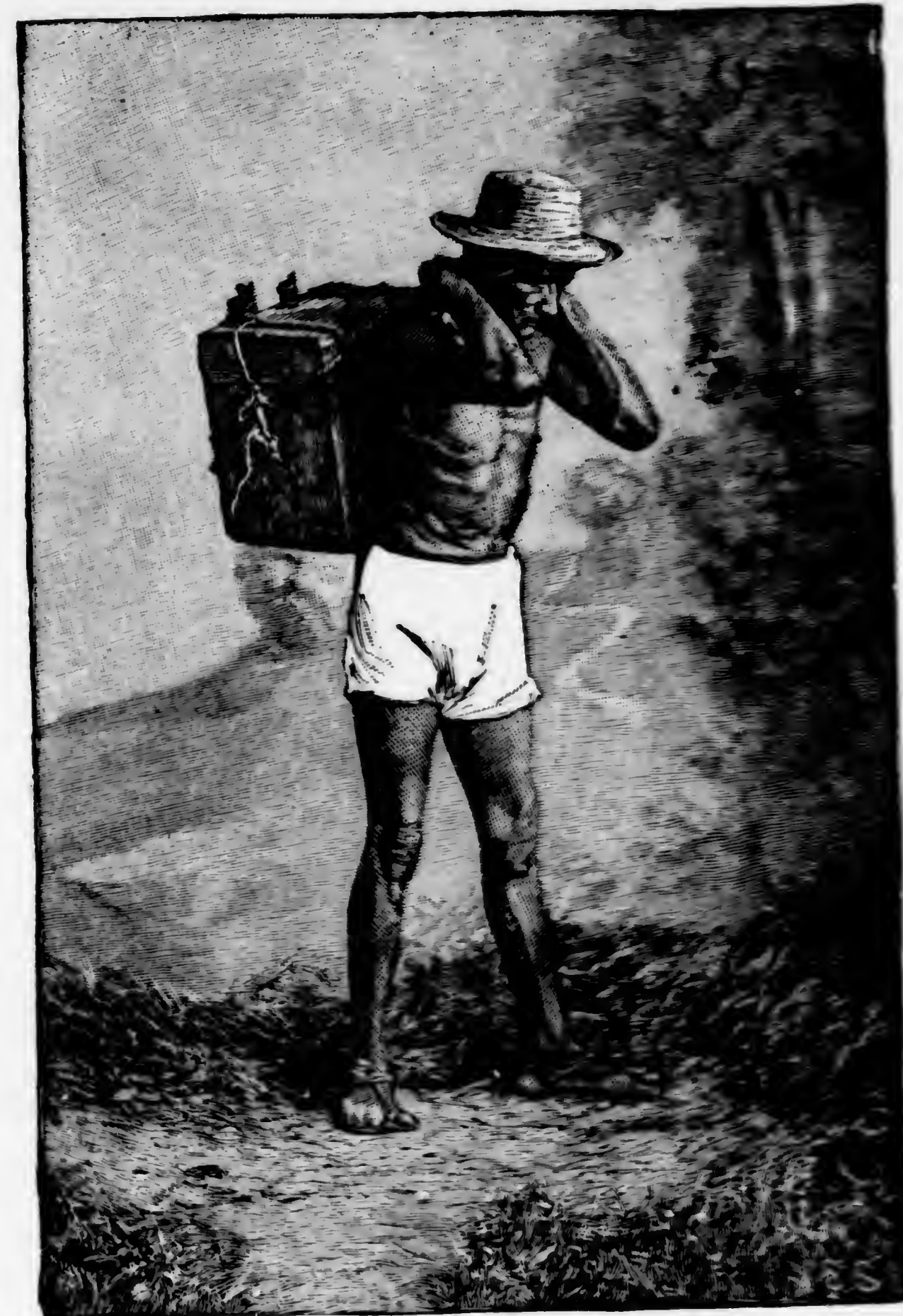
Indian Carrier, Yucatan.

Mucuyché, famous for its *cenote*, or water-cave. There are no rivers in Yucatan that flow above ground, and the people are wholly dependent upon the clouds for their supply of water, and upon the rivers that run beneath the surface. The whole province is one vast table of coral rock, beneath which flow large streams and even rivers. These break out at intervals into caves and caverns formed by earthquakes and the pressure of the water,

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Indian Carrier, Yucatan.

Mucuyché, famous for its *cenote*, or water-cave. There are no rivers in Yucatan that flow above ground, and the people are wholly dependent upon the clouds for their supply of water, and upon the rivers that run beneath the surface. The whole province is one vast table of coral rock, beneath which flow large streams and even rivers. These break out at intervals into caves and caverns formed by earthquakes and the pressure of the water,

Retake of Preceding Frame

though sometimes the supply is due to the infiltration of surface water into natural grottoes in the coral rock. The Indians, centuries ago, marked the courses of these subterranean streams by heaps of stones, and their cities were always built near or about the water-caves, as is now shown by their ruins. These caves, where the rivers appear to the light of day, are called *cenotes*. There are many in Yucatan, and in Merida are several, utilized as bathing places—most refreshing resorts in the heat of day. The



Indian Boy, Yucatan.

cenote at Mucuyché is a cavern, perhaps forty feet deep, broken down at one side, forming an arch of limestone with every shape of stalagmite and stalactite, the roof full of holes in which were the nests of hundreds of swallows and hornets. A flight of stone steps leads from the delightful garden above, and some avocado pears and cocoa palms growing at the bottom thrust their crowns above the general level of the ground. The water is clear and very deep

at the east end of the cave, with many fish in it—'cenote fish'—which are said to be blind, like those in the Mammoth cave. Roots of trees hang pendant in clusters, behind which lizards and iguanas dart along the ledges; swallows circle in dense masses about the arch, forming a complete ring, and making a deafening, whirring noise with their wings."

Another chapter is devoted to Mayapan and the Mayas, the author indulging in severe but well merited criticism of the methods of M. Charnay and of Dr. L. Plongeon, and for their hasty conclusions, based on preconceived notions, as to the age and builders of the ruined cities—they have so zealously explored.

We are then treated to accounts of the logwood forests and to scraps of the natural history of the north coast of Yucatan. Palenque was not visited by the author, though a chapter is devoted to this engrossing topic.

In the account of Mexico the chapter on Popocatepetl and the account of the ride from Vera Cruz to Mexico brings out clearly the nature of the better known Mexican volcanoes and of the three regions passed over in going from Vera Cruz to the City of Mexico. In Southern Mexico the palaces of Mitla, among which Mr. Ober spent a few days, are briefly described.

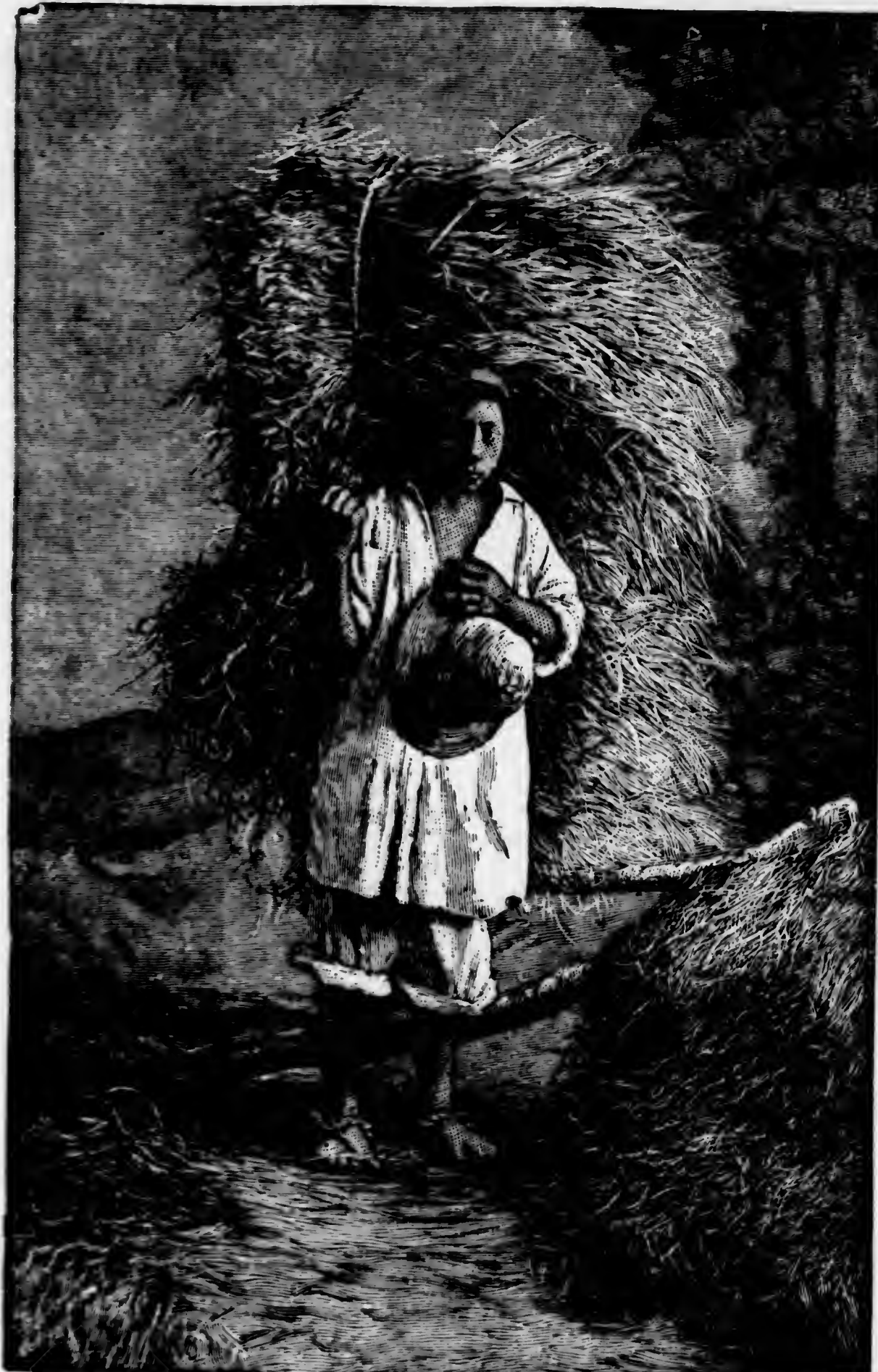
Though written to please the tastes of the public, we may be sure that the narrative is reliable, the information authentic, and that this book is, all in all, the best hand-book of Mexico the intending visitor to that interesting country can take along with him.

BRIEFER COURSE IN BOTANY.¹—We have examined this little volume with more than usual care. Two things command attention at once: First, that it is written by a teacher of experience; and second, that its author is both an acute observer and a thoroughly posted compiler. It is, in its text, a fresh book, that is, the presentation of the subject matter is done in such style as indicates that the author had thoroughly considered both the language and order of presentation of the facts.

The appearance of this book is most opportune. Botany, in this country, has largely passed through the preliminary period of *systematic work exclusively*. The great masters have arranged our vegetable hosts into an order which will, without serious change, stand for the next twenty years or more. And the growing need, as well as the growing desire, is to know more of the origin, structure and evolutionary tendencies of the individual plant. Good, cheap microscopes can now be had which make such studies possible. The Briefer Course in Botany, then, is just the book required to foster the existing disposition. There is nothing superficial in it, nothing needless introduced, nothing

¹ *American Science Series. Briefer Course in Botany.* By CHARLES E. BESSEY, M.Sc., Ph.D., professor of botany in Iowa Agricultural College. pp. 292. Published by Henry Holt & Co.

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Retake of Preceding Frame

ARCHAEOLOGY

Archaeologists Tunnel Into World's Largest Pyramid

MEXICAN archaeologists who are exploring the heart of the world's largest pyramid at Cholula, have unearthed numerous stone stairways which lead to a 130-foot paved platform.

The adobe pyramid is now honeycombed by some 1,000 feet of tunnels made by the archaeologists. The tunnels are enabling the explorers to reveal the interior complex of structures without disturbing the Spanish colonial church which now stands on top.

One stairway which has been found is over 160 feet wide, and is the widest stairway known in American archaeology. It appears to have been rebuilt four times. Its destination has not yet been revealed by the excavations.

The great pyramid is being excavated under the direction of the engineer Emilio Cuevas of the Mexican Direction of Archaeology.

Science News Letter, December 17, 1932

BOOK NOTICES.

Nagualism: A Study in Native American Folk-lore and History.
By Daniel G. Brinton, A.M., M.D., LL.D., D.Sc., &c. Philadelphia, 1894, McCalla, 8vo, 66 pp.

Nagualism was a powerful and mysterious cult which united Mexican and Central American tribes, belonging to different linguistic stocks, into organized opposition against the government and religion of their conquerors. The members of this inter-tribal organization were bound together by strange faculties and an occult learning which placed them on a par with the famed thaumaturgists and theodidacts of the Old World, and which preserved even into our days the thoughts and forms of a long-suppressed ritual.

The terms *nagual*, *nagualism*, *nagualist* are not Nahuatl, but of southern origin. A *nagual* was a personal guardian spirit, a personal totem, chosen in accordance with fixed rules and by consultation of an elaborate calendar, which was used mainly in astrological divination.

The nagualists were powerful enchanters, whom the clergy believed to be in league with the devil and who were thought to be able to transform themselves into beasts. They used in their operations an intoxicant, *peyotl*, and the seeds of a plant called *ololiuhqui*. Intoxication was an essential part in many of these severe rites. Under the old régime and before the coming of the Spaniards nagualists were especially devoted to the native cult; but it is Dr. Brinton's opinion, which he sustains with great research, that on the appearance of a foreign race and a new religion a new *motif* was given to this old cult. Those most interested in it turned their sorceries and enchantments with organized, terrific, and often with successful energy against a common enemy. Even the rituals of the Catholic church were travestied in the nagual ceremonies. Dr. Brinton gives a charming account of the exalted position assigned to women in this mysterious society. They were not only admitted to the degrees, but often held most important offices. One of them, Maria Candelaria, was among the Tzentals of Chiapas a native

Vol. 7, No. 4, Oct. 1894

Joan of Arc. The nagualistic rites were highly symbolic, and the symbols had clearly defined meanings. The most important symbol was fire. Of this Father de Leon says: "If any of their old superstitions has remained more deeply rooted than another in the hearts of these Indians, both men and women, it is this about fire and its worship and about making new fire and preserving it for a year in secret places."

Another symbol still venerated as a survival of the ancient cult is that of the tree. The species held in special respect is the ceiba (*Bombax ceiba*). The conventionalized form of this tree strongly resembles a cross, and this came to be the ideogram of "life."

The serpent was another revered symbol. In Chiapas one of the highest orders of the initiated was that of the *chanes* or serpents.

In reading this learned treatise one is strongly reminded of the studies of Mr. James Mooney, of the Bureau of Ethnology, upon the Ghost dance. There were exhibited at the World's Columbian Exposition four transparencies representing men and women going through the Ghost dance ceremonies, many of them swooning. It were easy to transfer these pictures to the scenes of Dr. Brinton's book. The subject is one of great interest to ethnologists, who have to thank Dr. Brinton for bringing together such a harvest of material from a field in which he is easily the chief gleaner.

OTIS T. MASON.

The Snake Ceremonials at Walpi. By J. Walter Fewkes, assisted by A. M. Stephen and J. G. Owens. (*A Journal of American Ethnology and Archaeology.* Vol. iv. Boston and New York, 1894.) Sq. 8°, vi, 126 pp., ill.

Captain Bourke, in 1883, first called the attention of the civilized world to the wonderful snake ceremonial of the Moki or Hopi of Arizona. After his return to the east in that year there appeared in several newspapers articles descriptive of the rite, most of which articles were probably the result of interviews with Captain Bourke. It was not until the following year (1884) that his important work on "The Snake Dance of the Moquis of Arizona" appeared. During the decade following his first

CLASSIFICATION OF LINGUISTIC FAMILIES,
Languages, and Dialects of Mexico
and Central America

By Cyrus Thomas

Am. Anthropologist, Vol. 4 (NS), No. 2,
207-216, June 1902.

(Complete paper in ^{our} files under
Classification of Indian Tribes.) *dam*

MEXICAN POTTERY

MENTAL traits of prehistoric Indian races of Mexico, as revealed by their pottery remains, were described at the session of the International Congress of Americanists, by Eduardo Noguera, of the Direction of Archeology of the Mexican Ministry of Education.

Mr. Noguera has made a statistical study of nearly 6,000 pottery samples in Mexican museums, including the art of the potters of the Zapotec, Mixtec, Tarascan, Toltec and Aztec races. This is the first study of its kind made on these civilizations.

The Indians were an intensely religious people, and their art of pottery making, which they carried to a high point of perfection, reflects their mental traits, the archeologist said. The comparative frequency of human, animal, plant, objective and geometrical motives shows the relative importance to the ancient race of the various creatures or things they represent, Mr. Noguera believes.

The pottery of the Zapotecs, of Oaxaca, a race that apparently had certain connections with the Mayas farther south and the Mexican races to the north, shows that the human figure was more important to them than any other form used as a decorative motive, suggesting that the race had left behind the totemic stage of culture and enjoyed the philosophic consolation of believing that the human being was the most important creature on earth.

In the cases of the pottery of the other races here studied, geometrical motives were more important than human ones in determining the shapes and decorations of their pots and idols and other clay objects. Human motives were much more common than animal, while plant motives were rare. Many of the geometrical symbols used on the pottery may, however, be conventionalizations of original natural forms that have lost all semblance to what they once were, he explained. This is true in the conventionalized snakes so well known in Mexican art, whose evolution can be traced from a realistic representation to a purely geometrical form.

HORTICULTURAL ART OF THE ANCIENT MEXICANS

Nor only the gardens of Montezuma, but the picture writing of his subjects prove the ancient Mexicans to have been great horticulturists. Their descendants still use their complex system of botanical names, a system which conveys information as to qualities, characteristics and habitat of many plants.

Wilson Popenoe, formerly of the U. S. Department of Agriculture, in a paper on "Plants of Aztec Picture Writing" gives a long list of botanical figures used in Aztec hieroglyphics. The flower symbol recurs constantly in all sorts of combinations as a place name. Maize, an important feature in all Indian life, appears frequently along with the sweet potato, the black bean, the cherry, plum, avocado and various less known native fruits. Most interesting is a combination of the water sign with the conventionalized sign for cultivated ground meaning "place where the land is irrigated." The familiar desert features, the yucca, the cactus and the mesquite, are all represented, but the gem of Mr. Popenoe's collection is the picture symbol which directly translated means "flea pepper," a fitting name for the biting, red hot pepper of the southwest.

The floating gardens of Mexico City, so famous during the conquest, may still be considered one of the best expressions of the native horticultural art. Willow trees are planted in the shallow water of Lake Xochimilcho in plots varying from 200 to 2,000 square feet. Their interlacing roots form a sort of basketwork that holds the soil with which the plots are filled while their tops are kept pruned so as not to shade too heavily the plants cultivated on the islands. The inhabitants of Mexico City are supplied to this day with vegetables, corn and flowers raised on these esthetic truck farms.

Science Supplement, March 5, 1926

TONE PATTERNS AND VERB FORMS IN A DIALECT OF ZAPOTEK

JAIME DE ANGULO

I. INTRODUCTION¹

A somewhat detailed study of this particular dialect is interesting for two reasons: firstly, because this is the dialect furthest removed from the primarily monosyllabic type characteristic of Zapotek and other related languages; secondly, because in its use of pitch tone it presents a very typical problem in the evolution of tone from a functional, variable, morphological factor to a fixed, independent, semasiological entity.

For it must be borne in mind that between tone used morphologically as a grammatical process, and tone used semantically, there lies a wide gulf. As part and parcel of a *semantema*, in other words as one of the phonetic elements which give this *semantema* its particular sign-value, its own recognizable face, tone is a fixed element, to be noted down once and for all in the semantic list. It is only when tone is used as a variable element, not a part of the *semantema* but an increment to it, by which its primary concept is modified either in a derivational or a relational manner, that tone-patterns arise, constituting a problem in form intuitively apprehended by the speakers of a language.

For instance, let us suppose (which is not the case) that in this particular dialect of Zapotek the *semantema* which expresses the concept of 'head', and which happens to be *ki*, were always in the high tone. Then this high tone would be a semantic element, to be noted once and for all in connection with *ki* 'head', in the lexicography of the language. As a matter of fact it is not so in this dialect; *ki* is high in the first person, low in the second, high in the third. It would be therefore impossible in a word-list to give a tone characteristic of *ki* 'head', because it all depends in what connections it is used in the sentence, whether 'my head', 'thy head', 'person's head', 'animal's head', 'thing's head'.

Now here is where the sense of pattern and form comes in: the values that obtained for *ki* 'head', namely high for the first person, low for

¹ The material upon which this study is based was obtained in Oaxaca in the course of a linguistic survey of that region for the Department of Anthropology of Mexico under the direction of Manuel Gamio.

the second, high for the third, are precisely the reverse of what is the most usual pattern in this dialect, and in fact in most languages of this group. Usually we have low for the first, high for the second, and low for the third. In other words we have in the case of *ki* 'head' a left-handed or 'mirror image' of what may be called the normal pattern. There are many other words like this, which follow exactly the reversed image of the normal tone pattern.

In terms of functional value, that is to say, when used as a grammatical element, a particular isolated tone has no meaning, no more than an isolated note in a melody. It is the whole paradigm of grammatical forms present in the unconscious linguistic mind of the speaker of a language, which makes the melody.

II. Dialectal Definition

The dialect under consideration is that of the Little Valley of Oaxaca, and more precisely that of the pueblo of Teotitlan del Valle.²

It is well to bear in mind that in the Zapotekan region the same phenomenon of 'village dialectal variation' obtains, as for instance in the Basque Provinces in the Pyrenees, or the several regions where Miwok is spoken in California. This phenomenon does not appear to be in any way related to segregation into pueblos or hamlets. Tewa and Tanoan are both characteristically pueblo languages. Tewa is essentially the same all along the course of the Rio Grande. Tanoan is so different in Taos, Isleta and Picuris that the people cannot understand each other. In the same way the people of Teotitlan hardly understand those of Mitla, distant not more than two hours' ride on horseback. It has often been said that every Zapotek pueblo has a language all its own. This is an exaggeration, but there is some truth in it.

In the following presentation, in order to prepare the ground for an understanding of the problem of tone, it will be necessary to outline the structure of this dialect of Zapotekan, even though in the briefest manner. The next two sections will therefore treat of those affixes which constitute the main lines of structure, without mention of tones.

III. The Suffixes Indicating Gender and Person

In Zapotek (and also in other languages of the same group) there is an essential division of the world into three genders: persons, animals, things. This generic classification is made use of, in conjunction with the persons 'I', 'thou', 'this one', 'we', 'ye', 'these ones', to express the syntactical relations ('mixed-relational concepts'). This occurs especially

² For classification of the dialects cf. LANGUAGE, 2.49; 132 (map).

in this dialect. In other words we have here a verb conjugated by gender.

I have already pointed out in a preceding article how these suffixes are nothing else than the words 'I', 'thou', 'person', 'animal', 'thing', postposited after the verb (or noun in the case of the Possessive) which they qualify, and more or less fused with it.

In the case of the verb, however, the gender 'thing' gives rise to what may be called an 'inobjective conjugation', what the Zapoteks themselves call in their Spanish jargon: 'hablar de frente', 'to use a verb without mentioning the object of the action, only the subject'. This is close to our acception of an intransitive verb, but it is not quite the same.

Here are the endings in both types of conjugation:

	Objective	Inobjective
'I'	a	ing
'thou'	u	iwing
'a person'	ang	'ni
'we'	do....nung	do....wing
'ye'	tu	twih
'several persons'	dah	dnih
'an animal'	..m or ..um	mih

This holds only for Teotitlan. The ending -ang comes probably from *ngiu* 'man'. In Tlacolula, Mitla, Tlacoahwaya and most other pueblos of the Little Valley, the ending for the third person is derived from the word for 'person': *be* or *bi*.

A few words will make the use of these suffixes as relational syntactic tools quite clear. If the subject of the action is mentioned by name close to the verb, there is no need of any suffix, the radical alone is enough. Thus: *naa tyug yah* 'I cut wood', *nyel tyug yah* 'Manuel cuts wood', *cbur tyug yah* 'his burro cuts wood'. If the subject is not mentioned by name, then he must be mentioned by suffix: *tyuga yah* 'I cut wood', *tyugang yah* 'he (a person) cuts wood', *tyugum yah* 'he (an animal) cuts wood'. In all of the preceding cases the object was mentioned by name. If it is not so mentioned, then the 'inobjective' conjugation is used: *naa tyuging* 'I cut' (I don't say what), *nyel tyug'ni* 'Manuel cuts',

cbur tyugmih 'his burro cuts'. It is perfectly evident that the 'inobjective' conjugation is simply an obscured 'thing' suffix. And the underlying monosyllabic structure is equally apparent. Many striking examples of this use of the suffixes are to be found in the short text appended.

IV. The Temporal Aspects

The orientation of the verbal forms lies along the line of aspect rather than of tense. It is less the delimitation of an event in a lineal succession of moments, than a description of the manner of its occurrence. That is why in the texts we find a lack of temporal concordance inside of the same sentence, which is shocking to our sense.

1. The INCIPIATIVE: the action is just about to begin, or is even actually beginning. May be translated by our simple Present, or rather by the expression 'I am going to', since in most of our European languages the Present has come to be used in the sense of an Habitative. Expressed in this dialect by the verb alone, or by the prefix *gu-* . . . , or by *ici-* . . . , more rarely by *sa-* . . . , *za-* . . . , or *si-*

2. The CONTINUATIVE: the action is taking place in a continuous, uninterrupted manner, either in the immediate past, in the present, or in the near future. May be translated by our simple Present, by our Imperfect, or by our Future, but it is best rendered by 'I am doing', 'être en train de . . .'. Expressed by *ka-*

3. The PERFECT: the action is entirely finished, completed, perfected, and has entirely ceased, and therefore has occurred necessarily in the past. Expressed by *ba-* . . . , or by *gu-*

4. The FREQUENTATIVE: the action is happening again and again repeatedly. This aspect partakes of the Iterative and the Habitative, and is sometimes used in this dialect in lieu of the Continuative. Best rendered in our languages by an agentive suffix. Thus, 'he is a wood-cutter' is rendered in Zapotek by the Frequentative: *ri-tyugang yah*, 'he frequently cuts wood'. Expressed by *ri-* . . . , *ru-* . . . , *r-* (The *r* is trilled, alveolar, sonant, one-trilled.)

5. The GERUNDIVE: the action is taking place at an indefinite time and in an indefinite manner, but as a result, or a consequence of, or a mere contingency upon something else. Examples: 'this tool is for cutting', 'this girl is marriageable', 'here is wool to card'. Expressed by *gal-*

6. The IMPERATIVE: used only in the second person, both singular and plural. It is expressed, curiously enough, in the singular by the same form as the Perfect, in the plural by *gul*+Continuative. For

instance: from *cuny*.. 'to run', *gu-cuny*.. Cont., *ba-cuny*.. Perf. :Impv. *ba-cuni* 'run thou!' *gul-gu-cuni* 'run ye!'

V. Types of Conjugation

The main lines of grammatical structure having been outlined in the preceding two sections, we may now proceed to analyze the problems of tone.

The pronominal or 'gender-suffixes', as they might perhaps better be called, are the same for any and all verbs. Not so however with the Temporal prefixes. According to their use the verbs may be divided into four classes, as follows:

In the following enumerations and lists the phonetic system of the A.A.A. has been followed, with the exception that for this dialect, at least as spoken in this pueblo, [g] is used to represent not a plosive but a sonant fricative. In most of the other dialects is found either a straight [g] or an affricate [gɣ].

The pitch tones are represented as follows:

$\acute{a}$ =high; $\acute{a}$ =middle; $\acute{a}$ =low; and hence the following combinations, which are not strictly in accordance with the A.A.A. system, but which have the advantage of simplicity and are quite permissible in this language where the vowels end normally either in a glottal catch or in a reduplicated 'echo-vowel': $\acute{a}\acute{a}$ descending from high to middle, $\acute{a}\acute{a}$ descending from middle to low, $\acute{a}\acute{a}$ descending from high to low, $\acute{a}\acute{a}$ ascending from low to middle, etc., etc.

This allows the use of the following pattern-notations which are of distinct use in the discussion of tones: (h)=high; (m)=middle; (l)=low; (hm)=either the succession of two level tones, first high, then middle, or (which is after all the same thing in practice, unless there is a glottal catch) a tone descending from high to middle. And similarly for the rest of the combinations: (ml), (hl), (lm), etc.

It may be well to mention that nasals are indicated by $\acute{a}$, $\acute{e}$, $\acute{i}$, etc., the nasal breath by $\acute{h}$.

Type A: INCIPIATIVE CONTINUATIVE PERFECT FREQUENTATIVE
no prefix $\acute{k}\acute{a}$ -.... $\acute{g}\acute{u}$ -.... $\acute{r}\acute{i}$ -....

Of this type are the following verbs:

The radical only is given; this radical is always followed by a suffix, represented here by two dots, with a certain fixed tone indicated here above the first dot. Thus $\acute{t}\acute{y}\acute{u}\acute{g}$.. stands for $\acute{t}\acute{y}\acute{u}\acute{g}\acute{u}$, $\acute{t}\acute{y}\acute{u}\acute{g}\acute{u}$, $\acute{t}\acute{y}\acute{u}\acute{g}\acute{u}\acute{g}$, $\acute{t}\acute{y}\acute{u}\acute{g}\acute{u}\acute{m}$, etc.

All irregularities are noted between parentheses. It must be remembered also that the middle tone is indicated by the absence of accent mark.

1. $\acute{t}\acute{y}\acute{u}\acute{g}$.. 'to cut'
2. $\acute{l}\acute{a}$ '.. 'to split' (Inc. $\acute{l}\acute{y}\acute{a}$ '..; Perf. $\acute{r}\acute{u}$ -)
3. $\acute{n}\acute{y}\acute{é}\acute{z}$.. 'to grab' (Per. $\acute{g}\acute{u}\acute{n}\acute{é}\acute{z}$..)
4. $\acute{k}\acute{á}$ '.. 'to take' (P. $\acute{k}\acute{w}\acute{á}$ '..; Imp. s. $\acute{k}\acute{w}\acute{á}\acute{t}\acute{g}$, pl. $\acute{g}\acute{u}\acute{l}\acute{k}\acute{á}\acute{t}\acute{g}$)
5. $\acute{b}\acute{e}$ '.. 'to take out' (I. $\acute{k}\acute{w}\acute{a}$ '..; P. $\acute{g}\acute{u}\acute{l}\acute{e}$ '..)

6. $\acute{l}(\acute{y})\acute{é}\acute{s}$ '.. 'to lift' (I. $\acute{l}\acute{y}\acute{é}\acute{s}$ '..; C. $\acute{k}\acute{á}\acute{l}\acute{é}\acute{s}$ '..; P. $\acute{g}\acute{u}\acute{l}\acute{é}\acute{s}$ '..; F. $\acute{r}\acute{i}\acute{l}\acute{y}\acute{é}\acute{s}$ '..)
7. $\acute{z}\acute{á}$ '.. 'to walk' (Imp. s. $\acute{g}\acute{w}\acute{é}\acute{é}$, pl. $\acute{g}\acute{u}\acute{l}\acute{i}\acute{c}\acute{á}$. Cf. 'to go' type C)
8. $\acute{y}\acute{á}\acute{b}$.. 'to fall' (cf. $\acute{s}\acute{á}\acute{b}$ '.. 'to fell' in type B)
9. $\acute{y}\acute{á}\acute{b}$ '.. 'to rain' (i.e. 'water to fall'; usually in conjunction with the word $\acute{n}\acute{i}\acute{s}$ 'water'; $\acute{k}\acute{á}\acute{y}\acute{á}\acute{b}\acute{f}\acute{g}$ 'it is raining', or $\acute{k}\acute{á}\acute{y}\acute{á}\acute{b}\acute{n}\acute{i}\acute{s}$ 'water is falling'.)
10. $\acute{d}\acute{i}\acute{n}\acute{y}$.. 'to fall' (P. $\acute{b}\acute{i}$ -)
11. $\acute{b}\acute{é}\acute{z}$.. } 'to wait' (I. $\acute{k}\acute{w}\acute{é}\acute{z}$..; C. $\acute{k}\acute{á}\acute{b}\acute{é}\acute{z}$..; P. $\acute{g}\acute{u}\acute{l}\acute{é}\acute{z}$..;
 $\acute{l}\acute{é}\acute{z}$.. } F. $\acute{r}\acute{i}\acute{b}\acute{é}\acute{z}$..; Imp. s. $\acute{g}\acute{u}\acute{l}\acute{é}\acute{z}$.., pl. $\acute{k}\acute{w}\acute{é}\acute{z}\acute{d}\acute{á}\acute{h}$)
12. $\acute{j}\acute{y}\acute{á}\acute{b}$ '.. 'to shuck maize'
13. $\acute{n}\acute{i}$ '.. 'to say' (P. $\acute{r}\acute{ú}$ -)
14. $\acute{n}\acute{i}\acute{l}\acute{y}$.. 'to say to oneself' (Imp. s. $\acute{n}\acute{é}\acute{l}\acute{y}\acute{á}$, pl. $\acute{n}\acute{é}\acute{l}\acute{i}\acute{t}\acute{á}$)
15. $\acute{s}\acute{ó}\acute{l}\acute{á}\acute{w}$.. 'to commence'
16. $\acute{y}\acute{á}\acute{k}\acute{b}\acute{e}$ '.. 'to know' (Imp. s. $\acute{b}\acute{y}\acute{á}\acute{k}\acute{b}\acute{e}$ '..; cf. 'to take', 'to take out')
17. $\acute{l}\acute{é}\acute{b}\acute{y}$.. 'to be wont' (cf. 'to accustom another' type B)
18. $\acute{y}\acute{á}\acute{k}\acute{á}\acute{t}\acute{c}\acute{y}$ '.. 'to be silent' (P. $\acute{b}\acute{i}$ -; Imp. s. $\acute{t}\acute{i}\acute{t}\acute{c}\acute{i}\acute{g}\acute{a}$; pl. $\acute{t}\acute{i}\acute{t}\acute{c}\acute{i}\acute{g}\acute{a}\acute{t}\acute{u}$)
19. $\acute{l}(\acute{y})\acute{é}\acute{s}\acute{t}\acute{é}\acute{e}\acute{g}$.. 'to wake someone else' (cf. 'to lift' No. 6)
20. $\acute{k}\acute{y}\acute{é}\acute{l}\acute{á}\acute{z}$ '.. 'to think' (P. $\acute{b}\acute{y}\acute{e}$ -)
21. $\acute{s}\acute{i}\acute{g}\acute{e}\acute{l}$.. } 'to forget' (I. $\acute{s}\acute{i}\acute{g}\acute{e}\acute{l}$..; C. $\acute{r}\acute{i}\acute{k}\acute{á}\acute{z}$..; P. $\acute{g}\acute{u}\acute{s}\acute{i}\acute{g}\acute{e}\acute{l}$ or $\acute{g}\acute{u}\acute{k}\acute{á}\acute{z}$..;
 $\acute{r}\acute{i}\acute{k}\acute{á}\acute{z}$.. } F. $\acute{r}\acute{i}\acute{s}\acute{i}\acute{g}\acute{e}\acute{l}$..; Imp. s. $\acute{h}\acute{u}\acute{r}\acute{i}\acute{k}\acute{á}\acute{z}\acute{u}\acute{n}\acute{a}$; pl. $\acute{h}\acute{u}\acute{r}\acute{i}\acute{k}\acute{á}\acute{z}\acute{u}\acute{n}\acute{a}$.)
22. $\acute{c}\acute{i}\acute{k}$ '.. 'to untie'

Type B: INCIPIATIVE CONTINUATIVE PERFECT FREQUENTATIVE

- | | $\acute{g}\acute{u}$ -.... | $\acute{k}\acute{á}$ -.... | $\acute{b}\acute{á}$ -.... | $\acute{r}\acute{u}$ -.... |
|--|--|----------------------------|----------------------------|----------------------------|
| 1. $\acute{t}\acute{s}\acute{á}\acute{b}$.. | 'to put' (The syllabic $\acute{z}$ is distinctly high in tone) | | | |
| 2. $\acute{s}\acute{á}\acute{b}$ '.. | 'to fell' | | | |
| 3. $\acute{d}\acute{n}\acute{é}$.. | 'to bring' (I. $\acute{g}\acute{e}$ -..; C. lacking; P. $\acute{b}\acute{e}$ -; F. $\acute{r}\acute{e}$ -) | | | |
| 4. .. $\acute{é}\acute{l}\acute{l}$ '.. | 'to come' (I. $\acute{g}\acute{é}\acute{l}\acute{l}$ '.. or $\acute{z}\acute{é}\acute{l}\acute{l}$ '..; C. $\acute{r}\acute{é}\acute{l}\acute{l}$ '.. - $\acute{k}\acute{á}$; P. $\acute{b}\acute{é}\acute{l}\acute{l}$ '..; F. $\acute{r}\acute{é}\acute{l}\acute{l}$ '..) | | | |
| 5. $\acute{b}\acute{f}$ '.. | 'to return' (I. $\acute{s}\acute{á}$ - or $\acute{g}\acute{á}$ -; P. $\acute{b}\acute{á}$ - or $\acute{g}\acute{á}$ -; F. lacking) | | | |
| 6. $\acute{t}\acute{é}$ '.. | 'to gather' | | | |
| 7. $\acute{c}\acute{ú}\acute{n}\acute{y}$.. | 'to run' (F. $\acute{r}\acute{i}$ -..) | | | |
| 8. $\acute{z}\acute{é}$ '.. | 'to make thread' | | | |
| 9. $\acute{t}\acute{é}\acute{d}\acute{d}$.. | 'to give' | | | |
| 10. $\acute{n}\acute{i}\acute{d}\acute{j}$ '.. | 'to give to oneself' (Imp. s. $\acute{b}\acute{á}\acute{d}\acute{e}\acute{d}\acute{f}\acute{g}$, pl. $\acute{g}\acute{u}\acute{d}\acute{e}\acute{d}\acute{w}\acute{f}\acute{g}$) | | | |
| 11. $\acute{t}\acute{á}\acute{w}$.. | 'to sell' (I. $\acute{t}\acute{c}\acute{t}$ -) | | | |
| 12. $\acute{l}\acute{i}\acute{b}\acute{y}$ '.. | 'to tie' | | | |

13. *bèjdt...* } 'to yell' (I. *kwèjdt...*; C. *kábèjdt...*; P. *hùrèjdt...*;
 rèjdt... } F. *ribèjdt...*; Imp.s. *hùrèjdt*, pl. *gùlkwidj*)
 14. *gàn'..* 'to be mistaken' (I. *zì-*; P. *bì-*; F. *rì-*)
 15. *nìs'..* 'to urinate' (cf. *nìs* 'water')
 16. *(u)ty..* 'to kill' (P. *byuty..*)
 17. *tciny'..* 'to marry' (C. *káyù-*)
 18. *yintcé'..* 'to weave' (F. *rwintcé'..*; Imp.s. *bìcá*)
 19. *jrìz..* 'to laugh' (I. *su-*; F. *ri-*)
 20. *leèby..* 'to accustom another'
 21. *tnlàw'..* 'to take care' (C. *káy-*)

Type C: INCIPIATIVE CONTINUATIVE PERFECT FREQUENTATIVE

- | | | | | |
|---------------------|-----------------|---|------------------|-----------------|
| | <i>tc-</i> | <i>ká-</i> | <i>gwé-</i> | <i>rì-</i> |
| 1. <i>sy..</i> | | 'to buy' (P. <i>gù-</i>) | | |
| 2. <i>(e)stèè</i> | | 'to wake up' (does not take suffixes; C. <i>káyéstèè</i>) | | |
| 3. <i>dzulaz'..</i> | | 'to be fond of' | | |
| 4. <i>nè'..</i> | | 'to bring' (C. lacking; cf. 'to bring' type B, No.3) | | |
| 5. <i>gàky'..</i> | | 'to shave' (P. <i>bì-</i> ; Imp.s. <i>bàgàkyi</i>) | | |
| 6. <i>tily'..</i> | | 'to bring' (C. <i>káhily..</i> ; F. <i>rihily..</i>) (also several aberrant forms of the Imp. s. <i>ryilwng</i> , pl. <i>ryillu</i> , <i>gùdilt</i> , <i>xàdilyùng</i>) | | |
| 7. <i>..u'..</i> | | 'to be at a place' (probably derived from <i>..k'..</i> 'to be permanently' see further down, section IV.; it is however conjugated differently: I. <i>tcu'..</i> C. <i>káyu'..</i> P. <i>gu'..</i> F. <i>ru'..</i>) | | |
| 8. | | (cf. also <i>tàw'..</i> 'to sell' type B, No. 11, which perhaps belongs rather here) | | |

It may be noticed that there are rather few verbs in this type, and furthermore that they are marked by a good deal of irregularity. On the other hand, if one compares the prefixes characteristic of this type C to the conjugation of the anomalous verb 'to go' (which follows), one is led to suspect that the prefixes are simply degraded forms of the verb 'to go', at least for the Incipiative and the Perfect.

If this is so, then it would go a long way toward explaining the prefixes in the whole series of verbs. The *ka-* of the Continuative characteristic of all four types of conjugations could on the other hand be referred to the verb *k'..* 'to be essentially'; an irregular verb in this language, which is given in its entirety at the end.

The verb 'to go':

	INCIPIATIVE	CONTINUATIVE	PERFECT	FREQUENTATIVE
'I'	<i>tcá'd</i> or <i>tcíng</i>	lacking	<i>gwáá</i>	<i>rá'a</i>
'thou'	<i>tcá'á</i> or <i>tcíwng</i>	—	<i>gwá'á</i>	<i>rá'á</i>
'he'	<i>tcyè</i> or <i>tcnè</i>	—	<i>gwé'è</i>	<i>ryè</i>
'we'	<i>dòtcáng</i> or <i>tcánwng</i>	—	?	?
'ye'	<i>tcá'á</i> or <i>tcá'wng</i>	—	?	?
'they'	<i>tcé'dá'á</i> or <i>tcá'dnè'á</i>	—	?	?

IMPERATIVE s.: either *gwée* or *tcí*, pl.: *gùlctá*

GERUNDIVE: *gùlctá*

Type D: INCIPIATIVE CONTINUATIVE PERFECT FREQUENTATIVE

g.... *ka-y*.... *gu-t*.... *r*....

In this type the prefix is fused with the radical. Furthermore, not only the suffixes change in tone according to person as in all other types of conjugation, but the radical also changes in tone instead of remaining fixed. It does this in the manner explained in the Introduction for the word *ki* 'head', giving rise to the functional patterns which will be presently described. It is therefore impossible to write down the tones in the list. An example will make this clear:

..u'.. 'to carry on the back'

	INC.	CONT.	PERF.
'I'	<i>gùá</i>	<i>káyùá</i>	<i>gùtùá</i>
'thou'	<i>gùú</i>	<i>káyùú</i>	<i>gùtùú</i>
'he'	<i>gùàng</i>	<i>káyùàng</i>	<i>gùtùàng</i>

The above is the normal pattern for the tones, but some verbs 'reverse' it, so as to give a left-handed or 'mirror'-image:

..un'.. 'to cry'

	INC.	CONT.	PERF.
'I'	<i>gùná</i>	<i>káyùná</i>	<i>gùtùná</i>
'thou'	<i>gùnú</i>	<i>káyùnú</i>	<i>gùtùnú</i>
'he'	<i>gùnàng</i>	<i>káyùnàng</i>	<i>gùtùnàng</i>

1. *..aw'..* 'to eat'
2. *..e'..* 'to drink' (P. *gwe'..*)
3. *..u'..* 'to carry on the back'
4. *..a'..* 'to be' (reverses the tone-pattern)

5. ..(a)sy.. 'to sleep'
6. ..un.. 'to cry' (reverses the tones) (P. also in *bi-*)
7. ..uny.. 'to make' (P. *bany..*; Imp.s. *bānī*)
8. ..(a)ty.. 'to die'
9. ..'any.. 'to dig'
11. ..app.. 'to have'
12. ..iny.. 'to hit' (I. *kiny..*)
13. ..uya.. 'to bite'
14. ..it.. 'to play' (I. *kit..*; P. *gu-dz-t..*)
15. ..iy.. 'to see' (reverses tones; I. *nya..*; P. *gunya..*)
16. ..iby.. 'to wash' (I. *kiby..*)

The list is not long, but it is noteworthy free of irregularities. Likewise it is well to note that all of the verbs in it are verbs in most constant use. It may very well be that they represent the older type in the language, a monosyllabic type based essentially on functional tone-patterns, while the other classes of verbs would represent a leveling to a fixed tone. This assumption is rather bold; but if correct, it would be of great importance.

VI. The Verb ..k.. 'to be', 'to be able'

A separate place must be made for this verb which seems to pervade the whole of Zapotekan morphology. And first of all it must be observed that the concepts of 'esse' and 'posse' are inextricably interwoven. It is the failure to realize this which has led in part to the fantastical grammars of Zapotek in existence. It is of course used in many idiomatic expressions, e.g.: *cí rākāng* 'what is the matter with him?'; *cí gūkā* 'what was the matter with you?'; *zākū gūnūng* 'can you do it?' (lit. 'you can you make'); *nāa kēttī gāktýá gūnīng* 'I cannot do it' (lit. 'I not-not I-can-not I-make'); *lā gāk nāa gūtyúgnā* 'I cut myself' (lit. 'this is I I-cut'); *lā gāk lūi gūtyúglūi* 'you cut yourself'. Note how in these last two examples the suffixes are not yet fused but merely agglutinated; they have however been levelled in the matter of tone. *Zak rsil* 'good morning' (lit. 'it-is morning'); *zak lei dji* 'good noon' ('it-is in the-day'); *zak dji* 'good afternoon' ('it-is day'); *zak crin* 'good evening' ('it-is evening'); *rikī* 'it must'; *zak* 'se puede'; *guk* 'se pudo'; *rikázá* 'I need', 'I must'; *rikázú* 'you need' 'you must'; *rikázá* 'he needs' 'he must'; *nāa kīng* 'I am' (in answer to the question: 'Who is the chief?'); *nāa gūkīn* 'I was'; *nāa gūkā preside'nīnā* 'I was the presidente municipal'; *lūi gūkā preside'nīlā* 'you were the presidente municipal'.

From all the examples I have collected, as well as from the paradigms I obtained on dictation from my informant (who was by profession a weaver with a strongly developed sense of form and who soon learned to conjugate 'in abstracto'), I have come to the conclusion that the element ..k.. represents the concept of 'being', 'being able to', 'having to', etc., and falls mainly into Type A. It is however too protean to be limited to any type, as will be seen from the existence of the two forms *k..* and *gak..* for the Incipative. In one of the forms the Continuative appears to be *kaya-k..* (Type D). But when reciting paradigms my informant always gave for the Continuative of the '*k..*' type A' form an entirely different semantema, namely *n..*, in the following wise:

'I am being'	('yo estoy siendo'—Spanish ad hoc)	<i>nāa nāng</i>
'thou art being'	('tu eres' ó 'tu estás siendo')	<i>lūi nāwīng</i>
'he is being'	('él está siendo')	<i>lāng nānīh</i> , etc.

This semantema *n..* appears in all sorts of ways, in all the dialects of Zapotek. Sometimes it occurs as a semi-prefix before 'adjectives': *nā-ngēés* 'black', *nā-ngūis* 'white', *nā-jnyāá* 'red', *nā-gá* 'green', etc., *nā-gūz* 'soft', *nā-jún* 'dry', *nā-nēed* 'hard', etc.; or before 'adverbs': *nā-rē* 'here', *nā-rē* 'there', *nā gá nā yījr rē* 'this hay is green' (lit. 'is green is grass here'); *nā gá iē nānīh* 'it is very green'. When speaking of things, the suffix *-īng* is often substituted for the *-nīh* characteristic of the 3d pers. 'inobjective': *ngēés nāīng* 'it is black' (speaking of a thing); *ngēés nām* 'he is black' (speaking of an animal); *ngēés nāng* 'he is black' (speaking of a man); *lāng nā-ngēés nānīh* 'he is black'; *nāīng* 'something' (i.e., 'it is').

As a suffix *-n..* has become so well agglutinated to many words that it is not felt as separable any longer; *bēnī* a person, *gūnā* a woman, *mānī* or *mān* an animal. It is quite likely that the whole system of the 'inobjective' conjugation is based on the *n..* 'to be' semantema, used as a 'thing'-suffix (*ni>in>īng*). This is also a bold assumption, but significant if correct.

VII. Summary

To resume our findings and group them together from the point of view of the use of tone.

The verbs fall into two groups, in the first of which tone is used as a functional factor, while in the second it has become levelled to a semantic character:

First group (functional tone): These are the verbs of type D. All of them verbs of primary meaning, characterized by a monosyllabic semantema. The tone of the semantema is not fixed but varies with the person, in such a way that in the dissyllabic combination produced by the fusion of radical and suffix the following tone-patterns are followed, which apply in general not only to verbs but also to nouns in the possessive case (i.e. 'my head', 'thy head', 'his head', etc.):

	normal	abnormal ('mirror-image' tones)
1st pers.	lh	hl
2d pers.	hl	lh
3d pers.	ll	hh

In the Continuative and in the Perfect, where we have a dissyllabic temporal prefix only the second syllable of which is fused, the first syllable of the prefix assumes a tone in correspondence with the pattern play,

1st pers.	hlh	lhl
2d pers.	lhl	hlh
3d pers.	lll	hhh

Second group (semantic tone): Verbs of types A, B and C, characterized, many of them, by a dissyllabic or trisyllabic semantema which can sometimes be clearly analyzed into its component parts. The tone or tones of the semantema have become fixed and invariable, and are therefore an essential distinguishing feature of the semantema itself. The tone of the suffix has become fixed for all three persons, and is either high, middle, or low according to the semantema involved, and is therefore also a part of the semantema and not of the suffix. The tones of the temporal prefixes are fixed and invariable, high for *ka-*, low for *gu-* (either when used for the Incipiative or the Perfect), low for *ru-*, *ri-*, high for *tc-*. The tone of the prefix must also therefore be looked upon as a semantic factor, although the prefix itself is a morpheme (i.e., a semantema which has lost its independent existence as a 'word').

VIII. Text

COYOTE AND RABBIT

Dictated by Manuel Jimenez of Teotitlan del Valle.

Somebody had planted a field of melons. Some damage was done. He said to himself: Who comes here to eat? He watched. And when

a rabbit came and started to eat he grabbed him. 'Now for sure,' he said to him, 'I will kill you'. Then he thought he would go and get some hot water. So he tied him up. There he lies in the midst of the field of melons. Then he went to gather wood to heat the water. There he lies, the rabbit, all tied up, when up comes Coyote and says to him, 'Now for sure I will eat you!' 'Why eat me?' says the rabbit. 'Here I lie tied, in order to make me marry a pretty woman. If you want to, you may lie down in my stead, and you marry her. I don't want to marry. That's why they tied me'. 'Yes!' says Coyote. He unties the rabbit and the rabbit ties him up. There he lies. And the rabbit goes away. When the owner of the field of melons went to get wood to heat the water, that's when he put a holy remedy into it. That's when Coyote ran away yelling.³

té¹ bént² rà'nàng³ cndi'a⁴ cá⁵ ru'ú⁶ dany⁷ néet'àng⁷
 one person sows melons then there is damage he says to himself
 táló máng⁸ rédtàw'àng⁹ àj bátnláw'àng⁹ tégwé¹⁰ konex¹⁰
 what animal comes and eats then he took care when came rabbit
 né¹¹ lám¹¹ ràùmih¹² àj gùnézàng¹³ lám¹³ ná'¹³
 and he the animal is eating and he grabbed him the animal now
 rá'únik¹⁴ rēbyàng¹⁴ lám¹⁴ síhinyá¹⁵ lúì¹⁵ àj bányàng¹⁵
 for sure he tells him the animal I will kill thee then he made
 cgab¹⁶ tcyé¹⁶ làú¹⁶ nís¹⁶ la¹⁶ aj¹⁶ bàllyàng¹⁶ lám¹⁶ ná'¹⁶
 thought he went to water hot then he tied him the animal now
 gá'ám¹⁷ ru'ú¹⁷ gál¹⁷ yí¹⁷ cndi'a¹⁷ àj zé'tàng¹⁷
 he lies (anim.) there is field plants melons then he goes fetches
 yák¹⁸ té¹⁸ dzòb¹⁸ nís¹⁸ la¹⁸ cá¹⁸ ná¹⁸ gá'¹⁸ té¹⁸ konex¹⁸ líbyúm¹⁸
 wood so that put water hot then now lies one rabbit tied (animal)
 tci¹⁹ gwé¹⁹ bèù¹⁹ tci¹⁹ kí¹⁹ rēbì¹⁹ bèù¹⁹ lám¹⁹ ná¹⁹
 when went coyote when that he says coyote to him the animal now
 rá'únik²⁰ zàwá²⁰ lúì²⁰ cìc-té²⁰ gáwu²⁰ ná²⁰ né²⁰ konex²⁰ ná²⁰ ré'²⁰
 for sure I am going to eat thee why eatest me say rabbit now here
 ná²¹ gá'á²¹ líbyá²¹ té²¹ gùtcinyá²¹ té²¹ gùná²¹ srúú²¹ bèl²¹ zà-gá'á²¹
 I lie tied in order that I marry one woman pretty if wilt go lie

³ Notice how in the above free translation I have adhered as strictly as possible to the Zapotek text, but always preserving the syntactic relations of English. Hence the obscurities of meaning which are not present in the original. It was done on purpose to bring out more clearly the essential build of the Zapotecan system of grammatical relations. This will appear clearly in the following text and literal translation.

jlétà *rèbyùm* *bèù* *té* *gùtcinyá*
 instead of me he (animal) says to coyote in order that wilt marry
lái *ndà* *két* *rikázdyá*¹⁹ *gùtcinyá* *nèkíní*²⁰ *bàlibdàh* *ndà* *yu'u*²¹
 thou I not I dont want I marry that's why they tied me yes
nè *bèù* *gùcikyúm* *konex* *àj* *bàlibí* *konex*
 say coyote he (animal) untied rabbit then tied rabbit
lám *ndà* *gà'tyúm* *rè-kí* *àj* *zé* *konex* *tci*
 him the animal now lies (animal) there then goes rabbit when
gwé *nìndà* *cténìng*²² *cndi'a* *gwètèng* *yàh* *gùdzòb* *nts* *la*
 went owner of melons went to gather wood he put water hot
*sant-rumedy*²³ *làù* *nts* *àj* *gwé* *bèù* *tci* *gùrèjdtam*
 holy remedy to water then went coyote when he (animal) yelled
tci *zèrlùm*²⁴
 when ran away

Grammatical Analysis

- (1) *te* < *tob* = 1 (*to-bi* 'one person'); *te* is rather an indefinite demonstrative.
- (2) *be-ni* 'person is'.
- (3) *r-a'n-ang* Freq. 'to sow', 3d sing. 'personal gender'.
- (4) Hispanism, 'sandía' 'watermelon'.
- (5) Freq.
- (6) Hispanism, 'daño' 'damage'.
- (7) Incip.; type A.
- (8) apparently a combination of 'to come' and 'to eat'; a good example of how this language evolves towards compounding of semantemas; not typical.
- (9) Perf.; type B.; 'inobjective'.
- (10) Hisp. 'conejo'.
- (11) *lam* < *la+ma* (*ma* 'animal').
- (12) Freq.; 3d pers. sing. 'animal'; inobjective.
- (13) 'objective' conjugation, because immediately followed by *lam*.
- (14) idiotism; combination of *ru'u* 'there is', and *ni* 'to be', *k* 'to be'.
- (15) *lau* 'face', used in all dialects to mean 'at', 'to', 'on', etc.
- (16) often used for 'there is'.
- (17) incipiative; this is the regular way to indicate a correlative participle.
- (18) no suffix of the 3d pers. because subject immediately mentioned; this rule not always adhered to strictly.
- (19) the negative always represented by *ket. .dy. .*
- (20) idiotism < *ni+k+ni*, three repetitions of 'to be'.
- (21) really the Freq. of the verb *u'u. .* 'to be', 'to be at a place'.
- (22) possessive; fully treated in a preceding article; see LANGUAGE 2.56.
- (23) Hisp.
- (24) not a real word but a joke.

Cutting Hole in Head Was Ancient Cure for Sinus

Evidence of Prehistoric Suffering and Surgery Revealed by Skulls Unearthed at Monte Alban

CURING sinus trouble by the heroic remedy of cutting a hole in the aching head was attempted by Indian surgeons in prehistoric American civilization, discoveries in Mexico reveal.

The operation was a technical success, perfect—slightly marred by the fact that the patient died.

Two cases of ancient skull surgery, one identified as a serious sinus case, have been found at Monte Alban, Mexico's prehistoric city famed for its treasure tomb revelations and other evidences of a remarkable civilization which Mexican archaeologists are now uncovering.

The prehistoric sinus sufferer's condition is shown by bony degeneration above the left eye, according to Dr. Daniel de la Borbolla, anthropologist of the Monte Alban expedition. The Indian doctor cut a small round hole less than an inch in diameter, whether to release pressure or to let out evil spirits, no one will ever know.

A second skull found immediately after the first discovery also bears marks of this prehistoric skull cutting known as trepanning. This patient, however, had better adjustment of bony tissue following the operation, suggesting that he survived for a while, at least.

Present explorations at the remarkable mountain top city of Monte Alban are about to end. Funds from private sources, with which Dr. Alfonso Caso, leader of the expedition, has attempted

to maintain the work, are exhausted. Dr. Caso, discoverer of the Monte Alban treasure of 1932, Dr. Borbolla, staff anthropologist, and other Mexican scientists, were relieved of their official positions when the present administration went into power in Mexico at the end of 1934. Largely through personal efforts of staff members, the Monte Alban explorations were carried on this year.

Important evidence—although not conclusive—has been found that the peak period of Monte Alban's history was about 300 to 500 A. D. This would make Monte Alban contemporaneous with the early era of the great Mayan empire, which lay farther south and east.

Another important discovery this year is a tomb with many hieroglyphs. These may throw new light on Zapotecan Indian script, which is a far greater mystery than Mayan or Aztec writing.

Science News Letter, March 23, 1935

Automobile horns and traffic whistles are banned in the streets of Rome.

23 LANGUAGES

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ARCHAEOLOGY

Temple Carved from Rock Excavated in Mexican Town

BUILDINGS chopped from a single piece of solid mountain form the strangest ancient ruins ever found in Mexico.

They cover an entire summit overlooking the present town of Malinalco, whose name means Place of Twisted Grass, and which is in the state of Mexico, westward from Mexico City.

One structure completely excavated now—the usual temple-topped pyramid—has broad stairs on one side, the steps and wide stone balustrades likewise part of a single piece. Only here and there, where the rock would not reach some far corner of the projected building, did the ancient mason have to fill in nature's lack with artificially cut stone block.

A number of features make this building unusual. One walks into the temple on top through an uninviting door formed by the yawning mouth of a giant stone snake. The temple itself is round, a shape rare in Mexico and one generally associated with the Wind God. A low stone bench follows the wall around inside. The roof, probably of perishable stuff like wood, is gone.



CARVED FROM ROCK

For trimming, this one-piece structure has mainly tigers, snakes and eagles. A carved stone tiger sits on a pedestal by the side of the stairs, his head missing. On either side of the snake-mouth door are carved eagle- and tiger-knights, such as represented the two old Mexican Indian military orders. The one is on a *huehuatl*, or wooden war drum; the other, on a snake's head. In the middle of the round room

of the structure are eagle-head carvings.

Further excavations are now being made at this novel site of Malinalco. These are under the direction of Jose Garcia Payon, Mexican archaeologist, who is finding various other buildings like this one. Some of the stairways still have traces of ancient paintings. This very odd monolithic "city" has ancient drains and sewers which used to protect the buildings when it rained.

Science News Letter, January 2, 1937

ARCHAEOLOGY

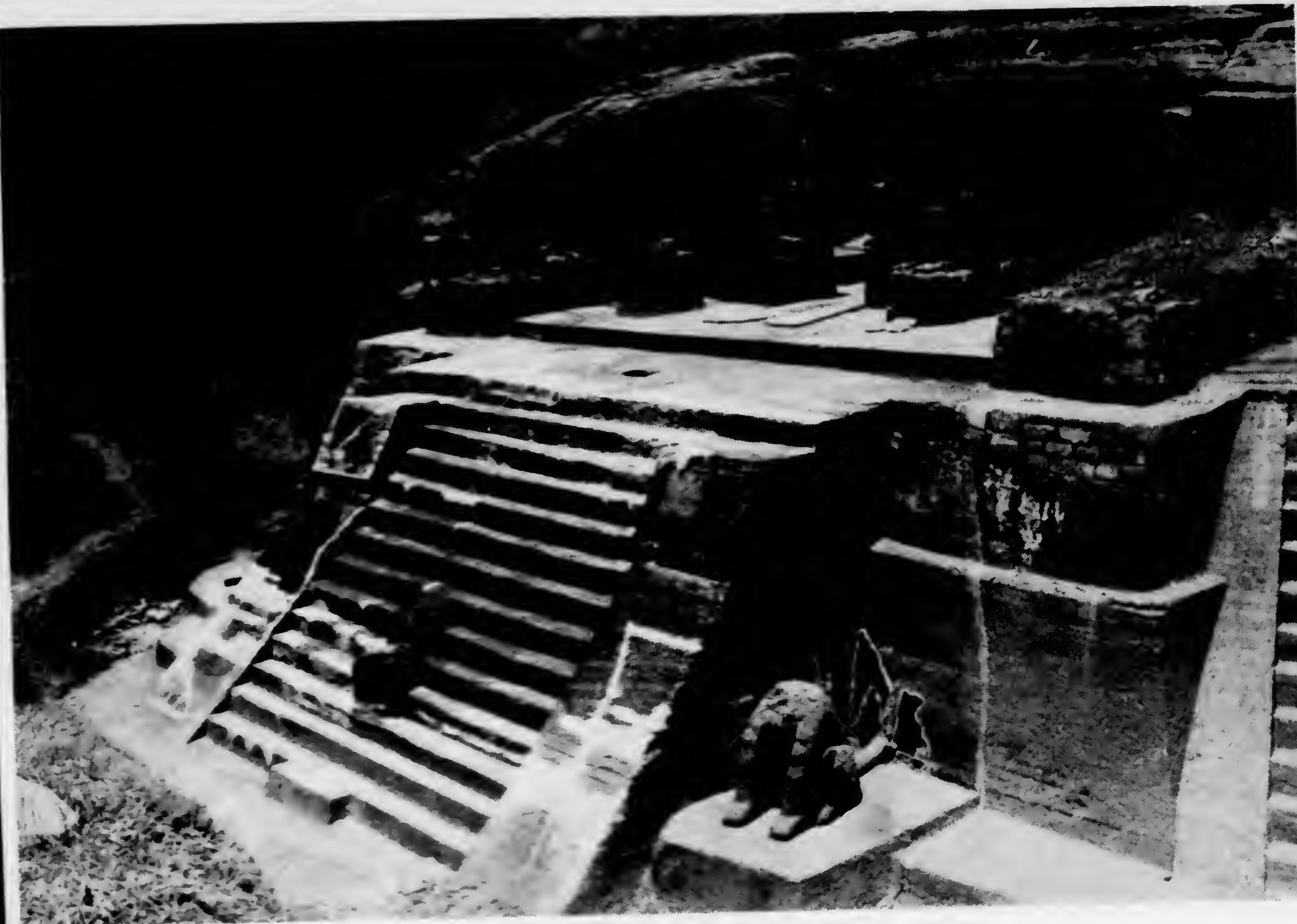
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Science News Letter, January 2, 1937

Retake of Preceding Frame

Ball Courts Give Long-Sought Ancient Monte Alban Date

By Tracing Evolution of Ball Game, Archaeologists Find That Mountain-Top City Was Occupied 1000 Years Ago

WILL AMERICA'S football stadiums and baseball diamonds become important aids to understanding our civilization a thousand years or so from now?

This comes to mind with the news that archaeologists in Mexico have placed the age of a seemingly ageless city by taking note of its ball games.

The city is the famous Monte Alban, today a maze of buried ruins perched on a mountain ridge. Monte Alban gained its widest modern fame when Mexican archaeologists entered a tomb there and found a group of dignitaries buried in shining golden regalia.

But to the archaeologists, whose first question about a place is "How old is it?" Monte Alban remained a mystery. The treasure tomb discovery added to the enigma, for it was "foreign" cache belonging to another culture deposited there for some reason not yet discovered. Dated tombs are being found in Monte Alban. But archaeologists can not yet read Zapotec Indian hieroglyphs, as they can Aztec and Mayan ones. Excavations of three seasons seemed to throw the dead city further and further back in time without a definite clue as to when it was a living metropolis. Now there is a clue. This is a tlachtli, or ball court.

Tlachtli was a widespread Indian game played apparently for both sport and religion. Frans Blom, archaeologist of Tulane University, has found ball courts in Mayan cities dating from early centuries of the Christian era in Chiapas and Guatemala. The game changed somewhat in the course of ten or fifteen centuries, to judge by the courts in Northern Yucatan known to date from a few centuries before the discovery of America.

All courts have an H-shaped space to play in. Very old ones of the south had several round altars in the center, and the side walls enclosing the field sloped. Northern courts lost their altars as centuries went by, their side walls became vertical, and big stone rings

were placed in them for the ball to go through. The Monte Alban court seems to fall between these types, as its walls still slope and are without a stone ring, although it had already lost all but one of its central altars. It is therefore likely that Monte Alban was occupied a thousand years ago.

When it ceased to be inhabited or when it began to be is not known, although Dr. Alfonso Caso, chief of the Mexican government archaeologists excavating there, believes Monte Alban may be contemporaneous with early Mayan cities of Chiapas in southern Mexico and Guatemala, and probably inspired by them.

Mayan culture in that region was full-fledged at the time of Christ. It had a complicated calendar, astronomical science, and mathematics, at that stage, for the evolution of which Dr. Caso believes that at least another thousand years had been necessary. Dr. Caso is inclined to think that the brilliant Mayas, during their long period of growth as well as at their height, inspired all the other cultures about them, far and near. He believes that the Monte Alban ball courts are evidence of the northern spread of this civilization, for the Maya land lies to the south and east of Monte Alban.

Science News Letter, March 24, 1934

EDUCATION

Geology, Economics, Politics Covered by School Texts

A UNIQUE education in Canada, during which geology, economics, and politics are covered by school texts, is being studied by Princeton University students. American college students find it common to study these subjects in the States will find it unusual.

The texts are written by the Geology School of the University of Toronto, and are fairly good. The geology is good.

ARCHAEOLOGY

Mixtec "Family Album" May Hold Secret of Lost Language

Less Known Than Mayas, Mixtecs Wrote in Hieroglyphics; Accompanying Spanish Script May Prove Key

A KEY to the as yet unread Mixtec hieroglyphs of ancient Mexico may be contained in an ancient Indian "family album" written on deerskin.

This codex, or manuscript, was brought to light by Miss Emma Reh of Washington, D. C., student of Mexican archaeology, who hopes an attempt will be made to decipher the imperfectly legible family history of a line of ancient Mixtec chieftains recorded in the deer-skin book.

Because the unread native hieroglyphs are accompanied by Mixtec handwriting in the Spanish alphabet, there is hope that study of this manuscript will provide means of understanding the symbols in which Mixtec Indians wrote.

Mixtec culture thrived in Mexico well before the better known Aztec civilization which existed at the time of the Spanish conquest in 1521. Even less is known about Mixtecs than the Mayas who built great stone cities farther south in the Yucatan peninsula of Mexico.

The document has added value because its origin is known. The majority of Indian picture writings now existing in museums have been rediscovered in forgotten European archives where they were sent as curiosities of the New World centuries ago, or have been bootlegged out of Mexico in secret, contraband trade in antiquities.

The new-found Mixtec manuscript, now in the National Museum at Mexico City, comes from Oaxaca, in southern Mexico. It folds into a book of eleven accordion pleats, and is read from back to front. Writing, pictures and glyphs are in black.

The "album" begins with a line of three Indians seated before a house, the elegance of which attests to their noble standing. They wear the regal Indian headband, and their name-signs above their heads show that they are called Two Alligator, Four Deer, and Nine Dog, respectively.

Their story begins in the Indian year "Three House." The Spanish date 1300 occurs on page two.

On this page begins a long line of marriages between Indian nobles and native women. Bigamy is performed on page three, where a chief marries two wives at once. Town names in hieroglyphs accompany each married couple.

Great-great-grandfathers and grandmothers pictured on the first eight pages dress as Indians and wear the queer hieroglyphs above their heads which tell their personal names.

On page nine, however, a significant change takes place. The native men and women acquire Spanish names, even Spanish clothes. Christian crosses appear. This happens in 1610. It is known that the Spanish crown allowed Indian nobles to be called "Don" and "Dona." From this page on, these "civilized" Indians wear Shakespearean hats.

The family record ends in 1684. It may have served as "proof of nobility" in some Indian legal claims before the Spanish Viceroy, Don Luis de Velazco, who is mentioned within.

Indian codices had various functions.

Some were family records such as these. Others were religious or historical. Certain ones were "maps," or agreements between Indian towns as to their hereditary land limits.

Of the latter, some still exist in Oaxaca. Indians believe if they lose these "pergamins" they lose the right to their lands. None but the Indian elders ever see them.

A half-breed of Tlaxiaco described such a "map" to Miss Reh. It belongs to a nearby Mixtec town and is brought out only during local cornfield wars over boundaries, which rage fiercely and frequently there. Fighting is largely done with stones, as in pre-Spanish times.

This document is said to have shrines, human figures and roads painted in black and brown on deerskin, the roads being indicated by human footprints. The "map" is kept rolled around a cylindrical green stone, the whole folded in another deerskin for protection.

Science News Letter, April 6, 1935

PHYSICS

Dust Storms "Make Air Blue" By Light-Scattering Effect

B LUE LIGHT during a dust storm has no necessary connection with the color of the dust itself, but is an effect of the scattering of light that strikes the microscopically tiny particles that fill the air. This explanation of a phenomenon often noticed this spring is offered by



MIXTEC FAMILY RECORD

Prof. W. J. Humphreys, physicist of the U. S. Weather Bureau.

Daylight does not always turn blue during a dust storm, but only when the air is densely filled with particles of the right size, Prof. Humphreys said. Then the effect is not the blue haze of distance, but a bluishness of the light falling on objects near at hand: the letters on your desk will look as though you were working at night by the light of a dim blue lamp.

The light turns blue, rather than another color, because of all the wavelengths that combine to make up ordinary white daylight, blue is most sharply scattered, upon striking a reflecting surface. Other wavelengths are scattered also, but to a less extent than the blue,

so that blue comes to predominate. A similar bluing of the light occurs when a cloud of wood smoke, which is made up of very small particles, comes between the observer and the sun.

The same phenomenon is responsible for the blue haze of distance. There are always large numbers of reflecting dust and water particles in the air, though fortunately not nearly so many as during a dust storm. Where their density is relatively low, you have to look a long way to see a blue horizon, as in the Rocky Mountains. Where the particle density is high, as it is in the East, comparatively nearby objects assume the hazy appearance that have given Eastern mountains such characteristic names as the Blue Ridge and the Great Smokies.

Science News Letter, April 6, 1935

land suitable for grazing if not for grain."

Hazards of living on these marginal lands can be reduced by various methods of amelioration, such as dam building and tree planting, Dr. Bowman points out. The effects of these, he says, "encourage us to believe that we are on the right track when we extend these beneficent operations in places or within areas where scientific studies indicate the greatest possibilities of success and where the population can profitably remain if the risk be reduced."

Science News Letter, April 6, 1935

PHYSIOLOGY

Heavy Water Molecules Trace Water in Body

WHEN YOU take a drink of water half of it is still in the body after nine days. And the average time a water molecule stays in the body is thirteen days.

This is the summary of investigations making use of heavy water for physiological studies of the water content of the human body developed by Prof. Georg von Hevesy and E. Hofer of the University of Freiburg in Germany.

Heavy water is the combination of oxygen and the isotope of hydrogen known as deuterium. For deuterium's discovery Prof. Harold C. Urey of Columbia University recently was awarded the 1934 Nobel Prize in Chemistry.

Because heavy water molecules can be distinguished by physical tests, although inseparable chemically from ordinary water, they can act as "tracers" in studying how the body eliminates water. Previously physiologists have never been able to make exact tests of how long the water in any particular "drink" stayed in the body.

Half the original quantity of water taken into the body is lost in from eight to ten days, report the scientists. The average time a water molecule spends in the body is from eleven and one half to fourteen and one half days.

"To explain this comparatively long time," state Prof. von Hevesy and Mr. Hofer, "we have to assume that most of the water taken becomes completely mixed with the water content of the body."

The scientists were able to make estimates of the amount of water in the body. Their value of from 59 to 67 per cent. is in fair agreement with known data.

Science News Letter, April 6, 1935

GEOGRAPHY

Not "Going to Prairie-Dogs" Drought Cycles an Old Story

FARM distress in the Western drought belt, compelling a population retreat to better-favored lands, has also caused in some quarters a pessimistic belief that that part of the country is now going permanently to the prairie-dogs. The West, think these gloomy ones, is "drying up," going desert.

This pessimistic view is subjected to damaging scholarly dissection by Dr. Isaiah Bowman, director of the American Geographical Society and vice-chairman of President Roosevelt's Science Advisory Board. (*Geographical Review*, Jan.) He cites evidence from many angles—glacier retreats, lake levels, tree rings, sunspot numbers—that the drought period of recent years has been only another downswing in a long, long story of climatic ups and downs.

Dramatic among evidences that "it hath been already of old time" are wagon tracks made by the Forty-Niners and others across the bed of Goose Lake, on the Oregon-California boundary, revealed now for the first time since the other earlier drought that permitted this American Exodus to cross, dry-shod, the southern end of this barrier sea.

Cycles there undoubtedly are in our climate, but as yet no man knows their beat, so that any but the most general predictions are unreliable. Nevertheless, says Dr. Bowman, "it can be predicted with complete assurance that members

of Congress will rise thirty, forty or fifty years from now and declaim against the shortsightedness of the legislatures and leaders of 1934-1935 who talked as if the whole West were becoming a desert once more."

Whether we are in the distressful phase of retreat or in the optimistic phase of a re-advance on the climatic upswing, it is a mistake, in Dr. Bowman's opinion, to over-simplify our problem, to try to understand it and solve it without taking all factors into consideration. He says:

"It is sometimes assumed that the answer to the question of so-called permanent settlement in areas of risk is to be found in economic conditions alone or in physical conditions alone. Only the amateur can think this way. Physical conditions and economic and social conditions dovetail. All economic opportunities rest in the last analysis on the land and its wealth in the form of agricultural soil fertility, minerals, grass and forest growth, and water supply.

"The climatic facts alone are not going to decide which parts of the West will be permanently inhabited. Those sub-marginal areas that have lowest reliability of rainfall and that have the poorest soil and the roughest surface and lie farthest from transportation lines should be abandoned first of all.

"The word 'abandoned' is used only in a relative sense. Such areas may have

THE STUDY OF SOUTH AMERICAN INDIANS

A STUDY of the many Amerind peoples who once possessed the two western continents is necessary if we are to understand the history, economic development or present psychology of the Latin-American nations to the south of us. This was the thesis advanced at the meeting of the American Philosophical Society on April 24, by Dr. A. V. Kidder, of the Carnegie Institution of Washington. We have not realized the importance and value of understanding Indians, he said, because in the development of the United States the original possessors of the land were simply swept aside and did not become a factor of much real significance.

But in the Latin-American countries, where the Indians still form a large proportion of the population, and where even the upper classes often have a considerable amalgam of Indian blood, one can not expect to gain an intelligent knowledge of the land without studying the history of the Indian in all its phases. Progress in the study of man has been slow because of the vastness of the subject, and also because its difficulties have not been frankly faced and cooperative investigations, upon which ultimate success presumably must depend, have seldom been undertaken.

Dr. Kidder pointed to the work of the Carnegie Institution of Washington and associated agencies in Yucatan as an example of success in such a cooperative anthropological and archeological enterprise.

"The chosen field is small," he said, "it is representative, it offers problems of world-wide and age-long significance. Work in Yucatan is to be prosecuted by specialists, but close touch is to be kept between the groups, with a view to the pooling of resources, the formulation of, and the planning of ultimate attacks upon problems which are too large for the present methodologic weapons of any one discipline, but which are of fundamental interest for all disciplines."

May 2, 1930.

Science, Science, Science

Science

Men of Monte Alban Re-shaped Heads and Teeth

IT HASN'T always been the woman who suffers for beauty, scientists can tell you.

Mexican archaeologists who are exploring the cemetery of ancient Monte Alban say that almost every human skull encountered this season has been flattened artificially. Teeth of Monte Alban's ancient inhabitants were filed to points or to other shapes, and inlaid with small round disks of contrasting minerals. Headaches and toothaches were undoubtedly just as painful a thousand years ago in America as they are today. But the Indian men acquired the distinction they coveted at any cost.

It was men alone who rated the honor of burial in the Monte Alban tombs, judging by the size of the bones and other anatomical criteria. In two cases bones from the cemetery are pronounced those of girls. But these, from their arrangement in the tomb, are believed to have been sacrificial child victims, not regular burials. They date from the early part of Monte Alban's history.

Science News Letter, March 31, 1934

Ethnology

THE DISTRIBUTION OF ABORIGINAL TRIBES AND LANGUAGES IN NORTH-WESTERN MEXICO—Carl Sauer—*Univ. of California Press*, 94 p., \$1. This volume, appearing as *Ibero-Americana* No. 5, was reviewed in the SCIENCE NEWS LETTER of March 24, 1934, and quoted as being free. The publication is priced at \$1.

Science News Letter, June 2, 1934

SCIENCE NEWS--DEC. 1929

96. THE CAUSEWAYS OF EASTERN YUCATAN

J. ERIC THOMPSON

A number of raised causeways, radiating from the city of Coba, were discovered by expeditions of the Carnegie Institute during the field season of 1926. Seven of these were definitely located and two more were reported on good authority. They vary in breadth from sixty feet downwards.

There is also considerable variety in their height and length. A comparative study of the dates and architecture of the cities which they link leads to the conclusion that they date from that period which marks the height of the old Empire. Their purpose would appear to have been primarily for religious and civil processions.



THE GRIM CONGRESS OF THE DEAD

After descending a dark, winding staircase, the visitor enters a dimly lighted corridor lined with the gaunt and grotesque forms of mummies. Some of the mummies still retain their burial clothes and, except for their withered expressions, they might be recognized for the people who passed through the narrow Guanajuato streets.

THE CATACOMBS OF GUANAJUATO

By E. F. CARTER

GUANAJUATO is perhaps the most unusual and the most unique city in all Mexico. It is situated high above the great central plateau and is the capital of the province of the same name. It lies a day's journey by rail west of Mexico City and is situated in a narrow mountain gorge through which flows the Guanajuato River—now thoroughly tamed by a tunnel that carries its waters harmlessly under the city but formerly the means of frequent floods and great destruction. The city itself is a source of much beauty with its white stone and adobe houses flanking the narrow cobblestone streets which were paved by the early Spaniards after they had wrested this site for their city away from the Tarascan Indians. The environs of the city are built into the sides of the mountain gorge and often the roofs of some of the houses are on a level with the ground floor of those adjoining. In the outskirts, organ cactus extends its spires high into the air and is often planted by the natives to serve for fences.

Up above the city in the grandeur of the surrounding mountains are some of the richest gold and silver mines in the country. They kept the Spanish exchequer filled for centuries. The ground below the irregular city is honeycombed with tunnels and shafts which penetrate rich deposits of gold and silver ore.

Guanajuato contains some of the most beautiful examples of Mexican churches, chief among which is the exquisitely decorated

Valenciana Cathedral, formerly maintained by thousands of miners who contributed every week the value of a piece of ore which corresponded to the size of their hand. The cathedral is located on an eminence far above the great mass of houses spreading through the narrow valley below. It commands a wonderful view of mountain scenery dotted with the gray and white adobe houses of the Mexican village. Part way down into the valley is the church of Bustos where pious peons come to pray for miraculous cures of their ills and sicknesses. A large portion of the interior of this church is completely covered with crutches, crude paintings, and rough clay models of hearts, lungs, eyes, legs, arms—representing the various organs or members of the body that have been healed. They hang there as a token of gratitude to the almighty goodness of the church saint.

Guanajuato also contains the Alhondiga de Granadita, once used as a species of grain market, often put to use as a fort, but now serving as a prison. This historic old building was one of the birthplaces of Mexican independence. It was here, in 1810, that a sturdy young peon from one of the mines succeeded, by supporting a heavy flat flagstone on his back as a shield, in charging his way through a terrific Spanish bombardment from above so that he was able to set fire to the massive wooden doors and thus open a path for a bloody Spanish massacre. Later, when the building was again in the hands of the Spaniards, the heads of



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four Mexican patriots were brought there and hung in iron cages which swung from hooks at the four corners of the building. For nearly ten years these grisly warnings swung high above the city.

However, neither cathedrals, mines nor old Spanish forts can exert the same weird fascination over the visitor as do the former inhabitants of this unique mountain city. They are to be found in the *Panteon*, or cemetery, which is located on a height that overlooks the city from one end to the other. The grass-covered cobblestone street that leads to the cemetery, and which is flanked with organ cactus, is a reminder in itself of those former inhabitants whose now useless hands paved the way to their final resting place.

The *Panteon* is built in the form of a great rectangular stone wall. Inside this enclosure are vaults and tombs built above the surface of the ground and occupied by the wealthier classes. The surrounding wall is composed of nothing but niches—layer upon layer. Due to the meagerness of topsoil throughout the vicinity, these niches serve as a burial chamber for the deceased who have left enough money or whose relatives can afford to rent one of the narrow compartments. Rents are payable for periods of five years, ten years or perpetuity. Bodies are slipped lengthwise into the niches; the last rites are held and then the opening is sealed with bricks and mortar. A marble slab is placed in front bearing the epitaph and often a photograph of the deceased. It is enthralling to walk around the square, observing the wreath-covered marble slabs—some faded, others green and fresh. Here there is an empty niche, waiting for a new occupant; over there is an epitaph that bears a glass-encased photograph of a little boy and tells the observer that he died at the age of five from smallpox. A wave of sadness passes over the visitor as he realizes that behind that cold marble slab only partially filling the niche is the body of the young child. A few niches farther and there is carved on the marble slab a short history of an American engineer killed by bandits—and so around the entire wall the epitaphs relate brief biographies of Mexican Army officers, Spanish aristocrats, young señoritas, infants and children.

After the termination of the five- or ten-year period, in many cases, relatives and friends of the unfortunate dead often forget or disappear and the new rent that falls due remains unpaid. When this happens the remains are removed from the niches and placed in a common ossuary. The startling fact about these remains is, that due to cli-



THE PANTEON

The *Panteon* is built in the form of a great rectangular stone wall. Within this wall are the vaults in which the members of the wealthier classes are buried. The dead must pay for the privilege of sleeping in their narrow tombs. If the necessary rent is not paid their bodies are transferred to the ossuary beneath the *Panteon*.

matic conditions and their close protection from decomposition among the inner niches of the wall, many of the bodies have mummified in a nearly perfect state of preservation. Practically the same attitudes and positions that the individuals had assumed at the time of their death still remain in the posture and expression of the mummified bodies.

The ossuary is tunneled in the form of a long catacomb or cave into the rock beneath the *Panteon*. It is known as the *calaboso* and is reached by uplifting a heavy stone trap-door in the pavement at the rear and descending dark, winding stone steps which lead the visitor into the dimly filtered light of a long corridor. He is left staring intently at a number of grotesque, shriveled forms. A dry odor of mustiness pervades the vault. A strong compelling curiosity forces the visitor forward into the penetrating atmosphere of the vault. As he becomes accustomed to the darkness after coming out of the bright sunlight, the shriveled figures begin to assume gruesome shapes.

Slowly the onlooker passes along, among the horror-stricken faces of the dead. It is here that the mummified bodies are brought after their

rent has been left unpaid and they have been removed from their vaults in the "wall of niches." A narrow wooden plank runs the length of the corridor. On this narrow bench the rigid forms stand side by side, leaning against the wall. On the stone-paved floor, with the edge of the bench as a prop and at rarer intervals than above, a second row of stiff, silent forms stands. Some of the mummies still retain their burial clothes, while on many others either all or part of these clothes have long since rotted off.

One mummy has only a pair of stockings, one up, one down, like some untidy boy. Another still lays claim to a good pair of boots which have survived the passage of time remarkably well. Some still retain suits, dresses and mantillas quite well preserved but wrinkled and faded. At one end of the corridor are the almost perfectly preserved mummies of small babies—nearly free from wrinkles and the effects of age—dressed in brightly colored infant clothes: little red and blue jackets, white dresses and lace caps—all lending a strange color that does not harmonize with the drab atmosphere.

One mummy in particular is singled out for attention. The red blood that once streamed down his right thigh is perfectly preserved and very lifelike. Even more so is the expression of horror upon his face. He is probably an old soldier whose side was shot away in battle.

A short distance
(Cont'd on page 64)



THE CATHEDRAL AT GUANAJUATO

The impressive Valenciana Cathedral at Guanajuato is situated high above the city, commanding a magnificent view of the surrounding mountains.

four Mexican patriots were brought there and hung in iron cages which swung from hooks at the four corners of the building. For nearly ten years these grisly warnings swung high above the city.

However, neither cathedrals, mines nor old Spanish forts can exert the same weird fascination over the visitor as do the former inhabitants of this unique mountain city. They are to be found in the *Panteon*, or cemetery, which is located on a height that overlooks the city from one end to the other. The grass-covered cobblestone street that leads to the cemetery, and which is flanked with organ cactus, is a reminder in itself of those former inhabitants whose now useless hands paved the way to their final resting place.

The *Panteon* is built in the form of a great rectangular stone wall. Inside this enclosure are vaults and tombs built above the surface of the ground and occupied by the wealthier classes. The surrounding wall is composed of nothing but niches—layer upon layer. Due to the meagerness of topsoil throughout the vicinity, these niches serve as a burial chamber for the deceased who have left enough money or whose relatives can afford to rent one of the narrow compartments. Rents are payable for periods of five years, ten years or perpetuity. Bodies are slipped lengthwise into the niches; the last rites are held and then the opening is sealed with bricks and mortar. A marble slab is placed in front bearing the epitaph and often a photograph of the deceased. It is enthralling to walk around the square, observing the wreath-covered marble slabs—some faded, others green and fresh. Here there is an empty niche, waiting for a new occupant; over there is an epitaph that bears a glass-encased photograph of a little boy and tells the observer that he died at the age of five from smallpox. A wave of sadness passes over the visitor as he realizes that behind that cold marble slab only partially filling the niche is the body of the young child. A few niches farther and there is carved on the marble slab a short history of an American engineer killed by bandits—and so around the entire wall the epitaphs relate brief biographies of Mexican Army officers, Spanish aristocrats, young señoritas, infants and children.

After the termination of the five- or ten-year period, in many cases, relatives and friends of the unfortunate dead often forget or disappear and the new rent that falls due remains unpaid. When this happens the remains are removed from the niches and placed in a common ossuary. The startling fact about these remains is, that due to cli-



THE PANTEON

The *Panteon* is built in the form of a great rectangular stone wall. Within this wall are the vaults in which the members of the wealthier classes are buried. The dead must pay for the privilege of sleeping in their narrow tombs. If the necessary rent is not paid their bodies are transferred to the ossuary beneath the *Panteon*.

matic conditions and their close protection from decomposition among the inner niches of the wall, many of the bodies have mummified in a nearly perfect state of preservation. Practically the same attitudes and positions that the individuals had assumed at the time of their death still remain in the posture and expression of the mummified bodies.

The ossuary is tunneled in the form of a long catacomb or cave into the rock beneath the *Panteon*. It is known as the *calaboso* and is reached by uplifting a heavy stone trap-door in the pavement at the rear and descending dark, winding stone steps which lead the visitor into the dimly filtered light of a long corridor. He is left staring intently at a number of grotesque, shriveled forms. A dry odor of mustiness pervades the vault. A strong compelling curiosity forces the visitor forward into the penetrating atmosphere of the vault. As he becomes accustomed to the darkness after coming out of the bright sunlight, the shriveled figures begin to assume gruesome shapes.

Slowly the onlooker passes along, among the horror-stricken faces of the dead. It is here that the mummified bodies are brought after their

rent has been left unpaid and they have been removed from their vaults in the "wall of niches." A narrow wooden plank runs the length of the corridor. On this narrow bench the rigid forms stand side by side, leaning against the wall. On the stone-paved floor, with the edge of the bench as a prop and at rarer intervals than above, a second row of stiff, silent forms stands. Some of the mummies still retain their burial clothes, while on many others either all or part of these clothes have long since rotted off.

One mummy has only a pair of stockings, one up, one down, like some untidy boy. Another still lays claim to a good pair of boots which have survived the passage of time remarkably well. Some still retain suits, dresses and mantillas quite well preserved but wrinkled and faded. At one end of the corridor are the almost perfectly preserved mummies of small babies—nearly free from

wrinkles and the effects of age—dressed in brightly colored infant clothes: little red and blue jackets, white dresses and lace caps—all lending a strange color that does not harmonize with the drab atmosphere.

One mummy in particular is singled out for attention. The red blood that once streamed down his right thigh is perfectly preserved and very lifelike. Even more so is the expression of horror upon his face. He is probably an old soldier whose side was shot away in battle.

A short distance
(Cont'd on page 64)



THE CATHEDRAL AT GUANAJUATO

The impressive Valenciana Cathedral at Guanajuato is situated high above the city, commanding a magnificent view of the surrounding mountains.

A MEXICAN LIBRARY 7,000 YEARS OLD

THE DISCOVERY OF A BURIED COLLECTION of engraved stone tablets near the city of Mexico is described by William L. Stidger in the *Dearborn Independent* (Dearborn, Mich.). The antiquarians who have discovered and unearthed this find say that it is a prehistoric library, the product of a Mongoloid civilization earlier than that of the Aztecs, or even that of their predecessors, the Toltecs. The situation of the buried tablets with reference to certain lava streams, the time of whose emission can be estimated, shows their age, we are told, to be at least 7,000 years—possibly much older. Mr. Stidger assures us that the days of the Revolution in Mexico never produced anything more exciting than those of July last, when Prof. William Niven and Dr. J. H. Cornyn uncovered this



By courtesy of the Dearborn Independent

REAL AMERICAN CLASSICS

Two "books" from a library in Mexico, which was completed thousands of years before Columbus came to America. The tablet on the right shows a picture of the sun god, while the one on the left contains the symbol of the volcano god, whose activities may have been responsible for the burying of this library under a layer of volcanic ashes.

library, from ten to twenty-five feet under the earth, just beneath a thick layer of volcanic ashes. We read:

"How old would you say the library is?" Professor Niven was asked, as the pieces tumbled out from perfect shelves where they had evidently been placed many thousands of years ago.

"At least seven thousand years old, and possibly ten thousand. We know that the volcanic deluge came about five thousand years ago, for we can measure that by the various strata that are above the volcanic debris. This entire valley was a great volcanic cone with fifty active volcanic mountains, and at least three of these giants constantly threw out streams of lava and ash and fire which inundated this valley like a great flood. It was at that inundation that this prehistoric library was covered and the attendants buried."

"To the average American mind this seems hard to believe. The prehistoric pyramid near Mexico City is so old that it has no ornaments on it at all. It is just a great, crude pyramid of rough masonry without a sign of cement to hold together the stones with which it is built. They are laid, stone upon stone, but they have stood through ten centuries or more. When I visited this pyramid they showed me a stream of lava which is twenty feet deep. You can see its pathway, as distinctly as you can see the Mississippi River, where it flowed forth from the now dead volcanic cone, winding its way down the valley toward the present site of Mexico City, covering everything in its path twenty feet deep, until it came to this ancient pyramid, which it surrounded as it would a small mountain. Professor Cummings has dug down through this layer of volcanic lava to the bottom of the pyramid, which is ten feet below the lava stream. As to the age of this pyramid, scientists know that the volcanic upheavals must have come at least seven thousand years ago, and the pyramid was erected centuries before that. Human skeletons are found both beneath and imbedded in this lava stream.

"So it is with the library that has just been uncovered by the

archeologists. They know that it is at a depth beneath the lava ash and debris, altho no stream of lava came this way.

"The books are tablets, just as the books of the libraries of ancient peoples have always been. These tablets are of all sizes. They have their writings on five sides of a stone. Some of the books are crude and some of them show a high degree of stone-book-making skill. They range over a long period of time, just as the books in our modern libraries do.

"How do you tell for a certainty the age and extent of this library?" Professor Niven was asked as we watched the men digging out piece after piece with ancient hieroglyphics telling the story of the past.

"Because we know certain letters and signs and figures. They are stable and certain. We have established them scientifically."

"What are some of these signs that you know for a certainty?"

"There are more than two hundred symbols that we can recognize in this library. We recognize the symbol of the moon, the symbol of fire, the earth mother, water, lightning, the sun's rays, the symbol of the volcano god, the symbols of morning and evening, the symbols of the various stars and heavenly bodies, of which the people of that period knew much. Many of the books of the Mongoloid library are books on the stars. They knew the heavens."

"When did this Mongolian civilization which left behind it this tremendous library exist?" these men were asked.

"Many centuries before even the Toltec or the Aztec races."

"In this excavated library of the Mongoloid civilization that preceded both the Toltec or Aztec civilizations, a conventional flower is the sign which represented fire; a half circle with a concentric circle represented either the rising or the setting sun; a cross represented the four movements of the sun.

"Mythical animals appear in this library and they are always connected with the fire and sun signs.

"The sun is always shown in yellow or orange.

"The fire is always shown in a deep red.

"The water symbol is always in green or blue.

"The morning symbol is always white.

"Each day new books from this library are being unearthed, and they have these symbols and stories still intact; perfect specimens, with the colors still as brilliant as when they were painted on and baked in clay ten thousand years ago. This set of ancient books tells us that the fire god is the oldest god of

the Mongolian civilization. He is always represented as a wrinkled old man. He always wears a pointed hat as a symbol of productivity. The origin of the fire god was the volcanic-shaped cone with fire pouring out, but it evolved into the cone-shaped hat of another symbolism.

"Smoke is always represented by upward-curling rays.

"The mountain god is said by the Aztecs to have an incense pot burning inside of the volcanoes. There are historic evidences of three great volcanoes which ten centuries ago were in constant eruption. These are represented by three circles in all symbolism

O.....O.....O
sun god.....volcano god.....fire god

"This symbolism came down from the Mongolian civilization up to the Aztec times."

One conventional type of deep dish is found constantly in these ruins. It is a great incense dish. Symbolically it represents the Mexico Valley. On the edge are three volcano gods, each with a hole through his body coming out of the top of his head. In this hole the ancient peoples burned their incense. These three volcano gods were the three great volcanic mountains that at that time were in constant eruption. To quote further:

"This library shows that the various pyramids that were erected in the valley also represented worship of the volcano gods. They are shaped like a volcano and the chief method of worship was to build fires on the tops of these pyramids and keep them burning for fifty-two years, which was the century of these ancient peoples. It was on top of these pyramids that human sacrifices were made to the volcano gods long before the Aztecs came along with their human sacrifices.

"In addition to the books, architectural drawings have been dug up by hundreds.

"They are drawn by the architect in colors and show each dimension and floor of the various pyramids and temples."

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recent past, Mexico has been publicly pilfered of its most precious treasures of history and art. Beginning with the Conquistadores, Indian objects worked in gold were made into bullion and shipped away in Spanish galleons, sometimes to be robbed, or sunk by pirates. In earliest colonial times Indian temples and palaces were dismantled, and the stones used for Spanish houses and churches. Archaeological tigers' heads are seen as gargoyles on Mexican colonial houses, serpents' jaws and heads as decorative motives, and lintels of temples as doortreads of Christian churches.

In the last one hundred years, since American antiquities have begun to stir scientific interest in the world, Mexico has been systematically robbed of the best specimens. Temple walls were ruined to extract some carving or figures for some American or European museum. Certain foreigners in recent years had established lucrative businesses in Mexico, collecting archaeological objects to ship out of the country. In the last fifteen years that has been illegal, and the Mexican government has watched its border points with care, examining all baggage leaving the country. Idol-running nevertheless is still an exciting game below the Rio Grande, with government officials preventing it as best they can.

Science News Letter, January 30, 1932

ARCHAEOLOGY

Monte Alban Treasure May Set Jewelry Style

See Front Cover

THE proud inhabitants of Oaxaca, in whose vicinity the Mixtec treasure tomb was found, think they are going to set the world's jewelry styles. A casual glance at the ornaments and trinkets reveals that archaeology has already influenced modern jewelers.

One of the most beautiful objects found in the Mixtec tomb of Monte Alban is a carved and filigreed breast ornament of gold. The human head with its enormous headdress represents a "tiger knight," Senor Caso, discoverer of the tomb, said. The fierce gold fangs of the animal are bared. Among the ancient Mixtecs, Aztecs, and other Mexican Indian groups, there were orders of knighthood, as there were in contemporary medieval Europe. Most famous were the tiger and the eagle knights. These American knights wore masks of the symbolic animal of their order, and the man's head protruded from between the animal's jaws.

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ARCHAEOLOGY

Monte Alban Long Seen as Important Archaeological Site

ANCIENT Monte Alban, in southern Mexico, where warriors' graves have just yielded treasures that recall the riches of Egypt's tombs, has long been looked on by scientists as one of America's most important archaeological sites.

Its riches have been known, for in 1902 a non-scientific expedition took treasures of jade and gold from a royal grave. An earthquake in 1927 split an ancient tomb and spilled jade.

"White Mountain"

When the Spaniards conquered Mexico in 1521, and went south to Oaxaca, they found Mixtec and Zapotec Indians living in Mitla, a city famous for its ornate palaces of stone mosaics and brilliant paintings. But Monte Alban, not many miles away, was ruined and forgotten. Indians in Mitla did not know who built it, or when or why it was deserted. The Spaniards called it Monte Alban, "White Mountain."

It is built on the crest of a ridge some 2,000 feet above rich green valleys, and over 6,000 feet above the level of the sea. It used to be a pleasant morning's jaunt on horseback along a narrow mountain path, but since 1931 a road has led to the summit and the trip is now one of only twenty minutes. The modern town of Oaxaca is a blur of pink and white and green below.

Ancient Monte Alban was literally chiselled out of the backbone of a mountain. The natural surfaces were made by the unknown builders into terraces of different levels. Sides of terraces were walled with stone, and stairways led up sheer declivities. It was well fortified.

The city is a maze of symmetrical terraces and sunken plazas, upon which minor terraces and pyramidal substructures stand, crowned by temple and palace ruins. These buildings are now stumps, and centuries of earth and vegetation veil them.

Monte Alban is intriguing to archaeologists. It recalls both the Mayan cities to the south, and Indian cities of central Mexico, like Teotihuacan, far to the north of Monte Alban.

The Mayan people were in their time the foremost in America, but their origins are buried in mystery. The

mystery seems to have some of its roots in Monte Alban, to judge by certain signs. The inverted V-shaped Mayan arch is found in tombs of Monte Alban, and so are sentinel stones whose human figures and hieroglyphs are carved in almost Mayan fashion.

The excavations at Monte Alban, conducted by Alfonso Caso, archaeologist of the Mexico City National Museum, mark the first scientific work at that ancient city. They mark a new step, too, in Mexican scientific annals, for it is the first time archaeological work is carried on in that country by private local enterprise.

Science News Letter, January 30, 1932



ANCIENT FINERY

Among the jewelry of the treasure tomb just found in the ancient city of Monte Alban, in Southern Mexico, is a strand of thirty-one hollow gold beads. An ornate lavalliere, made in six pendant pieces, is filigreed and carved, and terminates in drop-shaped golden bells. Another article is the golden handle of a fan still held by the crumbling fingers of a skeleton. There is a necklace of seven golden shells from each of which dangle drop-shaped golden bells. The jewelry was buried for an unknown number of centuries in the Oaxaca tomb, but the art that made it is not lost. Modern Mexican Indian gold and silver jewelry recalls these ancient styles.

mean that Mixtecs had conquered that city. Archaeological work there is so new that little is as yet known of its probable history. Before the Mexican archaeologist, Alfonso Caso, found the sensational Mixtec treasure tomb, he had unearthed the giant stairway of a terrace that had been enlarged three different times. This could indicate three different epochs of the history of the city.

Mayan in Style

Carvings of human figures on stone in Monte Alban are very Mayan in style. Zapotec numerals are also written as in Maya. Many archaeologists believe the Zapotecs learned this from their Mayan neighbors, but others think the process may have been the other way around. Alfonso Caso, who has already made a beginning in classifying Zapotec writing and calendar signs, thought the Mayas might have lived in Oaxaca before they moved south, and that the Zapotec calendar may be based on an earlier form of the Mayan one.

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Origin of Mayan Calendar Sought in Monte Alban

THE FABULOUS TREASURES of ancient Indians which the Mexican archaeologist, Alfonso Caso, has found in a tomb of Monte Alban, are not the greatest treasures for which he is seeking.

When Sr. Caso started the excavations in October, he said that he expected to find a tomb of kings or priests in Monte Alban. But he also expected to find new information on the Zapotec calendar, which would be of great scientific importance.

Before starting his excavations, Sr. Caso had already gathered archaeological materials from Mexican, American, and European museums for a comparative study of Zapotec writing. From these studies he has deduced certain principles of the hieroglyphic system the Zapotecs used.

Sr. Caso believes it possible that the Mayan calendar, the most notable achievement of any native American civilization, originated in Oaxaca, the state in which Monte Alban was a great city.

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~~Blueberries in the United States are grown chiefly on wild or semi-wild lands.~~



SITE OF THE DISCOVERY

Ruins of buildings in the ancient Zapotec City of Monte Alban, Oaxaca, Mexico, where the treasure tomb of Mixtec warriors was found.

ARCHAEOLOGY

Finding Cache is Fabulous Treasure Tale Come True

FABULOUS treasure tales are as common in Mexico as in lurid fiction. But the recent finding of a real cache of Indian wealth was nevertheless a surprise, and one of the most unusual discoveries in American archaeology.

It recalls the tales of gleaming golden cities the Conquistadores sought, and the hidden Indian wealth they never found. Mexican archaeologists stated months ago that their digging in Monte Alban would prove sensational, but they themselves hardly expected the riches disclosed in a warriors' tomb in that ancient southern mountain city.

Treasure hunts have been without number in Mexico. An American stock company was even formed, once upon a time, to look for the fabulous wealth the legendary Plumed Serpent God, Quetzalcoatl, dropped in his mythical flight from the unknown city of Tula.

Part of the treasure of the Aztec Montezuma was actually once in Spanish hands. But the soldiers of Cortes dropped it in the mud and water in their flight over the lake at Tenochtitlan, as Mexico City was called in pre-Spanish times. When Cortes made his victorious return in 1521, he found the rest of the Aztec treasure gone. Indians were said to have hidden it in the meantime. Cortes burned the feet of the Aztec prince Cuauhtemoc, "Fallen Eagle," to make him talk, but he would not reveal

the treasure's whereabouts. Other tortured Indian nobles groaned, but Fallen Eagle, with his smoking feet, made his famous retort to them, "And do you think mine is a bed of roses?" Cortes killed him, but the treasure was never found. So much Mexican treasure is lost that Mexicans jocosely say that if only part of it were found, it would pay the national debt.

The find at Monte Alban sounds like fiction but for the fact that strange things of gold and gems now lie in the vaults of the National Bank. Monte Alban always had a glamorous reputation. When that southern land of Oaxaca was a vassal state of Montezuma's empire, the natives sent taxes of gold and jade.

Science News Letter, January 30, 1932

ARCHAEOLOGY

Mexican Law Forbids Sale Of Monte Alban Valuables

ALTHOUGH extremely valuable treasures have been found in Monte Alban, according to Mexican law they are not for sale or transfer out of the country. They are considered not as of cash, but as of scientific value, and as art and historical treasures belonging to the nation.

Such laws are still comparatively new in Mexico, for at all times but in the

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Retake of Preceding Frame

ARCHAEOLOGY

Discoverer of Mexican Tomb Reveals Its Strange Treasure

Six Dead Warriors, Richly Ornamented, Greeted Entrance Of Explorers at Monte Alban, says Chief Archaeologist

By ALFONSO CASO

Archaeologist of the National Museum of Mexico and discoverer of Monte Alban prehistoric tomb.

In this exclusive dispatch, Sr. Caso gives the first authentic details of his discovery that promises to solve the mystery of an unknown prehistoric American race that buried its warriors surrounded by gold, precious stones and carved human bones, rivalling in splendor the tombs of Egypt.

FOR DAYS we had been excavating at Monte Alban, the ancient fortress-city, now a mountain of ruins, near Oaxaca City in southern Mexico. At last our picks and shovels uncovered the entrance of the ancient Mixtec Indian tomb that was to prove so interesting and rich in treasure and archaeological evidences.

We entered the tomb through an antechamber approached by a pair of steps. As we made our way within we found that there were two rooms, separated by a portal. The first of these rooms has a flat ceiling, but the second is a gabled vault with ceiling like an inverted V.

There we saw dead warriors, six of them, seated around the walls, jewel-covered and ornamented with gold and other precious things. The long years had dealt severely with them. We found that their skeletons had practically disintegrated during the many decades since they had been placed there.

Near them were many extraordinary objects—gold, silver, copper, jade, turquoise, shell, pearl, coral and other materials.

These precious articles were immediately removed under guard to the vaults of the Bank of Mexico for safe-keeping.

Human bones, beautifully carved, were found in the tomb, and promise to be of the greatest scientific interest. They are carved with a technique not surpassed by fine Chinese work on ivory. The various engravings upon these portions of human skeletons picture happenings of history. They also have

worked upon them details from the ritual calendars used by these ancient Indians.

Thus the carved bones are veritable leaves of books, books of human bone used to record information important to this ancient race.

A sacred mask that represents the Indian god, Xipetotec, is one of the ornaments of gold.

A diadem of gold, breast ornaments of gold, bracelets and necklaces, all of gold and beautifully worked, were among the treasure of the tomb.

An unusual bowl of rock crystal and several beautiful alabaster vessels were in the mass of treasure. Many pearls were also found, some of unusual size.

A human skull, richly encrusted with turquoise and shell, was probably some ancient warrior's trophy. When it was found it had a flint knife resting in the



ALFONSO CASO

—the Mexican archaeologist who engineered what is probably the greatest archaeological find in American history.

hollow of the nose.

Those who explored this ancient tomb with me were Martin Bazan, Juan Valenzuela and my wife.

Science News Letter, January 30, 1932

ARCHAEOLOGY

Mixtec Warriors in Treasure Tomb May Have Been Invaders

THE MIXTEC warriors buried with their fabulous gold and gems in a recently discovered tomb of the ancient Indian city of Monte Alban, may have been intruders. This is what archaeologists now suggest, for the dead warriors were probably Mixtec, while the city where they were was always considered Zapotec.

Mixtecs and Zapotecs now live together in the southern Mexican state of Oaxaca where the tomb was found. They speak related languages, and together with about half a dozen other Indian groups form what scientists call the Zapotec linguistic family.

Mixtecs and Zapotecs differ in customs and language from their southern Mayan neighbors who were once the most remarkable nation in America. They also differ from their spectacular

Aztec neighbors to the north, although all American Indians are of the same great race.

The Mixtecs had as their great city Mitla, "place of the dead," not many miles from Monte Alban. Mitla lies in a sunburned cactus-covered plain. Its many beautiful palaces and temples of geometrical stone mosaics stand on low wide terraces that hardly rise from the ground.

The Zapotec city of Monte Alban, on the other hand, is built on platforms of a mountain top. The natural mountain profile was strikingly changed by the hand of man. Mitla was a living city at the time of the Spanish Conquest, but Monte Alban on its mountain top was already dead and forgotten.

The presence of Mixtec warriors' graves in Zapotec Monte Alban may

ARCHAEOLOGY

Discoverer of Mexican Tomb Reveals Its Strange Treasure

Six Dead Warriors, Richly Ornamented, Greeted Entrance Of Explorers at Monte Alban, says Chief Archaeologist

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Retake of Preceding Frame

SCIENCE NEWS--DEC. 1928

97. OTOMI TEXTILES IN THE STATES OF MEXICO AND HIDALGO

FRANCES TOOR

Many of the villages of the States of Mexico and Hidalgo are populated by Otomis, once part of the Chicimecans, one of the earliest of the nomadic races of pre-Conquest Mexico. They are poor and degenerate from too much pulque drinking, but they still conserve much of the ancient refinement in their customs and beauty in their textiles.

The women of the villages in the State of Mexico weave a heavy wool cloth of dark colors, with a pin cross stripe, of which they make their skirts or *chinquetes*. They also weave the long sashes of interesting designs with which they hold these on. In some villages they wear *quexquemals* and in others *huipils*, which are also woven at home.

In the State of Hidalgo there is more factory made cotton used by the women in their dresses, but they weave remarkable fine cotton sashes and beautiful woolen bags with conventionalized bird and animal designs.

Their methods of weaving are entirely primitive, but only in extremely rare cases do they make their own yarns and dyes.

15. THE HIEROGLYPHS OF TENAYUCA, MEXICO

ALFONSO CASO

I. The *xiuhcoatl*, the altar of skulls and the hieroglyphic stairs of Tenayuca.

II. The meaning of the *xiuhcoatl*.

III. The death head altar. Similarity to Altar A of Tizatlan, and to the skull altars of the Chief Temple of Mexico. Do these monuments symbolize the Death of the Sun?

IV. The hieroglyphic stairway. On the stairs of the earlier pyramid, the hieroglyphs follow a sequence not found on the stairs of the later pyramid.

V. Description and interpretation of the hieroglyphs. Lack of dates. Nearly all the hieroglyphs have a solar association. The temple of Tenayuca, apparently was dedicated to the Sun.

SCIENCE NEWS--DEC. 1929

94. THE LANGUAGE OF CHICOMUCELO

FRANZ TERMER

The language of Chicomucelo, a village on the northern slope of the Sierra Madre of Chiapas in the Department of Comitán, was first recorded in 1894 by Karl Sapper. He found close relation to the distant Huasteca.

In 1926 the author revisited the village. Only three individuals of advanced age spoke the language. The total amount of material collected consists of 372 words. There are close relations to the Mam group of western Guatemala represented by the languages of Jacaltenango, Chuj and Solomeno and the dialects of the Mam in a few villages in western and northern Guatemala.

It appears therefore that the Chicomucelo belongs to the remains of the widely distributed Maya population on the northern slope of the Sierra Madre of Chiapas and is a connecting link between the Guatemalteco branch of the Maya family and the Huasteca. It seems probable that the tribes of the Isthmus of Tehuantepec and of Chiapanecan were of importance in the development of the later conditions. It seems likely that the original home of the Maya was in Chiapas, Tabasco and Guatemala.

that line to superficial short courses. The remedy for this serious shortcoming lies in the reorganization of our undergraduate dental work to the end that it will be based on a proper preliminary training of not less than two years of prescribed liberal arts college work.

"Until graduate and research work in our dental schools is organized on a proper logical, scholastic basis, we have little to hope for in research at these institutions. Indications, however, point to an early recognition of this deficiency on the part of universities conducting dental schools and the not distant future will see many of our educational institutions reorganized for graduate instruction in dentistry and provided with adequate funds, just as they are already organized and provided for in other branches of learning."

Dr. Banzhaf commended the recent bulletin issued by the Carnegie Foundation of which he said: "The effect of the study of dental education by the Carnegie Foundation which was recently published is already a foregone conclusion. The *Bulletin* will do much to impress the importance of dental schools upon the chief executives and regents of certain universities who have not yet realized the true significance of dentistry as an essential part of health service. It will also stress the need of dental schools in the appreciation of those citizens who are philanthropically inclined and who desire to donate funds for the purpose of aiding dental education. Last year contributions to medical schools amounted to \$100,000,000."

POTTERY FROM TLAXCALA

AMONG the most beautiful pottery made by people in America before the coming of the Spaniards is the pottery of Tlaxcala, in Mexico, says Dr. Eduardo Noguera, of the Mexican department of archeology. Dr. Noguera, who has been excavating an Aztec temple near the town of Tlaxcala, has found a number of specimens of the ceramic art of that race.

The typical Tlaxcala pottery is distinguished by its extreme hardness and its red color. It is made of well-mixed clay and is better baked than most pottery of other regions, he said.

The Mexico City museum collection shows that the deft Tlaxcalan potter made plates and cups, pots and pans with supports, jugs with handles and bowls and dishes with almost flat bottoms, and cups with snouts. There are some vessels in the form of the human foot and others in the shape of various animals.

Most of the pieces have red or yellow foundations upon which are painted designs in yellow, red, white, gray or black. Pyramid figures are common symbols used in the decoration and there are also human figures, emblems of gods, men, animals, plants and portions of the anatomy such as hands, skulls and hearts. The patterns are highly conventionalized and show easy skill.

Some of the vessels are embossed with human or animal heads which serve as handles. Grotesque heads of humans, birds or snakes are used as the feet of vessels.

The Tlaxcalan pottery appears to be a link between the ceramic art of the Mayas of the south and the races further north, Dr. Noguera says. Examples of Tlaxcalan pottery are found so widely scattered over distant parts of Mexico that it is thought that it was valued highly for its beauty and perhaps served as a medium of exchange.

AVIATION WEATHER PROBLEMS

AVIATION'S rapid advance has created such a demand for weather information and research upon the weather hazards of flying that a committee of meteorologists is now considering how flying can be better served by the science of meteorology.

The committee is sponsored by the Daniel Guggenheim Fund for the Promotion of Aeronautics and is headed by a young Swedish meteorologist, Carl-Gustaf Rossby, who has been carrying on special researches in this country. The other members, who represent branches of the United States Government concerned with aeronautics, are Willis R. Gregg, of the Weather Bureau; Thomas H. Chapman, of the Department of Commerce; Major William R. Blair, Signal Corps, U. S. Army, and Lieutenant Francis W. Reichelderfer, Bureau of Aeronautics, Navy Department. The committee has its headquarters at the Weather Bureau, in Washington.

Though it has existed only since the end of July, the committee has already embarked energetically upon its duties. One of its first steps was to undertake a survey of the present status of meteorological instruction in the United States. It is a well-known fact that the tendency of educational institutions in this country has been to slight meteorology. The relatively few courses offered in this subject deal, as a rule, with its superficial aspects rather than with fundamentals. The committee recently addressed a questionnaire to leading universities and technical schools concerning the amount and character of the instruction now given in this field. As soon as an analysis of the replies has been made the committee will draw up recommendations looking to the more adequate teaching of meteorology in American institutions.

Pending the desired improvements in this respect, the committee has outlined a plan for courses of instruction in aeronautical meteorology to be given at the central office of the Weather Bureau. If this plan receives official approval, a number of the younger employees of the bureau, who have had sufficient preliminary education, will be assigned to attend the classes, and it is likely that qualified persons not connected with the bureau will also be permitted to attend. A tentative program of courses has already been drawn up.

On recommendation of the committee the Guggenheim Fund has made a grant to cover the cost of preparing a report on existing knowledge of fog and haze, especially as bearing on the prediction of these conditions for the benefit of aviators. H. C. Willett, of the Weather Bureau, will be sent abroad for a year to prepare the report, and will spend about half of the period at the Geophysical Institute, Bergen, Norway.

THE ANCIENT AMERICAN CIVILIZATIONS AND CALENDARS

UNDER the above title and within a period of eight months I recently made a communication, consecutively, to the British Association for the Advancement of Science in Oxford, the International Congress of Americanists in Rome, the Anthropological Society of Washington, D. C. and the Sociedad Científica "Antonio Alzate" in Mexico City.

In this communication I first pointed out that all the ancient American centers of civilization were situated between the tropics; that within this zone the year consists of two seasons only: the dry and the wet and a striking phenomenon occurs, namely, the passage of the sun through the zenith twice a year, at irregular intervals, according to the differences of latitude.

I next submitted irrefutable historical, documentary, archeological and pictorial proofs that the ancient astronomer-priests, inhabiting even widely separated parts of this tropical zone, observed the phenomenon by means of gnomons consisting of upright poles, stelae, pillars, altars or constructions with vertical walls, and interpreted the periodically recurring total disappearance of their shadows about noon, as a "descent of the sun-god," whom they represented, pictorially and sculpturally, under the form of a human being descending head foremost or seated, at rest, within the solar disk; or under the form of different birds or of a jaguar. As in Mexico, when the phenomenon occurs towards the end of the dry season, it heralds the advent of rain generated by the heat of the vertical solar rays and as the growth of vegetation ensued, the ancient Mexican sages began their solar years at the moment when, marking the approach of the rainy season, the sun-god descended upon the gnomons and these cast no shadows.

At the end of my communication to the Sociedad Antonio Alzate in Mexico City I made the sugges-

tion that the ancient observation of the annual phenomenon, which marked the beginning of the Aztec New Year and is always allowed to pass by unobserved and unmentioned by the present inhabitants of the capital, be revived as a national school festival, which would be of educational and patriotic value as it would link the present with the past generations of native Mexicans. My suggestion was received with enthusiasm by the president and members of the society and on May 18 the impressive phenomenon was observed in several schools in Mexico City, the most important celebration being held in the great courtyard of the new normal school under the auspices of its directors, Señor Aguirre and Señora Berlanga; of Señor Gallo, the director of the Astronomical Observatory, and of Señor Heliadoro del Valle, who, with other eminent professors, initiated a celebration in which over six thousand pupils took part with song and dance. The hope I also expressed that this beautiful nature festival will likewise be revived in other anciently inhabited centers within the tropical zone bids fair to be realized next year, as official representatives of Peru and Guatemala have already expressed their intention to recommend the adoption of the same school festival in their countries, and it is probable that others will follow suit.

I am at present engaged in preparing for publication a book containing the complete presentation of the results of my researches on the subject which have extended over thirty years.

ZELIA NUTTALL

CASA ALVARADO,
COYOACAN D. F.,
MEXICO

Science, Aug. 26, 1927

VIGNETTES OF GUADALAJARA

BY FREDERICK SIMPICH

AUTHOR OF "NORTH AMERICA'S OLDEST METROPOLIS (MEXICO CITY)," "A MEXICAN LAND OF CANAAN," "ALONG OUR SIDE OF THE MEXICAN BORDER," "SO BIG TEXAS," ETC., ETC., IN THE NATIONAL GEOGRAPHIC MAGAZINE

AT CRACK of dawn came the clang and peal of countless bells. The din was startling in its unexpectedness. It sounded like a battle call—or an alarm that Guadalajara was burning.

Hurriedly I got up and went out on the hotel balcony.

"All these churches," said a voice at my elbow, "and every bell with a different tone." It was the man from the room next to mine, a Spanish friend from the sugar plantations, in pajamas and straw sandals.

"I first came here more than 40 years ago, from Spain," he added. "We made the last stretch in a four-mule stagecoach on leather springs, after a night battle with bandits. We got in just at dawn, with these same bells ringing. Nothing here has changed much—the same people, habits, churches, and bells. Even the bats are still here. Read at night, and your light draws the moths; turn out the light, and bats fly in to eat the moths. But they don't eat their wings—next morning moth wings are all over your floor!"

In the street below now black-garbed women, their heads covered, were walking quietly to Mass—women of all classes, peon and aristocrat, but hardly any men. Rattling heavily, a water cart turned the corner, sprinkling the streets and raising that ammonia smell of old adobe towns where humans and beasts have long crowded the absorbent soil too closely. You meet that same smell, mixed with the scent of roasting coffee, when at early morning men wet the dusty streets of Aden or Baghdad.

THE MILKMAN AND THE TURKEY MAN

"Ice!" "Bread!" "Morning paper!" All voices of the awakening city as truly as cackles, crows, grunts, and squeals are the alarm clocks of the farmer. Before the doorway halted an old man on a mule, carrying two big cans. A sleepy girl, with a clay jar, came out and bought some milk. And the man rode on, calling his singsong "*Leche, leche*," milk, milk, in a despairing wail, more like a cry of pain than an invitation to buy.

Now a country boy in a ragged straw hat comes driving a flock of turkeys. He

carries a long stick, with a whiplike piece of string on one end, for flicking any errant turkey on the neck. He urges them on by hissing sounds, his tongue against his upper teeth, in the familiar Indian warning. They market thousands of turkeys on foot here, as in parts of Texas, the inquisitive, shapely birds marching with quick, graceful strides, necks jerking sharply with each step. One strutting gobbler, with pendent red wattles long as a prophet's beard, ruffled his bronze plumage and dragged his wings till we could hear them scrape (see page 337).

"Imitation of a general," chuckled the old Spaniard. "*Pavo* is the true Spanish word for turkey, but here they use the Aztec word *guajolote*. Aztec names are used for other birds, too. Owl is *tecolote*; raven, *cacalote*; buzzard, *zopilote*, and so forth."

By the time we had dressed, clapped our hands for coffee, and read a Mexican paper still damp and smelling of fresh ink, all Guadalajara was swarming. Tramcars were crowded; so were the busses.

Bobbed-haired señoritas, in bright organdie, silk hose, and high heels, chattered and giggled their cheerful way to work in stores, beauty and curio shops, at switchboards or typewriters. Many were pure Andalusian types, with blue eyes and blond hair, small, shapely hands and feet. The ease and joy with which man may look upon womankind in Guadalajara are proverbial. "In all Mexico, no others are so fair." . . . "Surely St. Peter must have opened the gates of heaven to let down such a beautiful damsel," Mexicans say when a maid of pulchritude is passing.

Along with the crowd, ogling the girls, came sleek young bank clerks, bookkeepers in the brewery, the factories, motorcar and other agencies, spick and span in flannels of Hollywood cut, carrying sticks, smoking pungent native cigarettes.

The sidewalks of Guadalajara! Walk them at this hour and you see the city eye-high and close up. With the old Spaniard I went exploring.

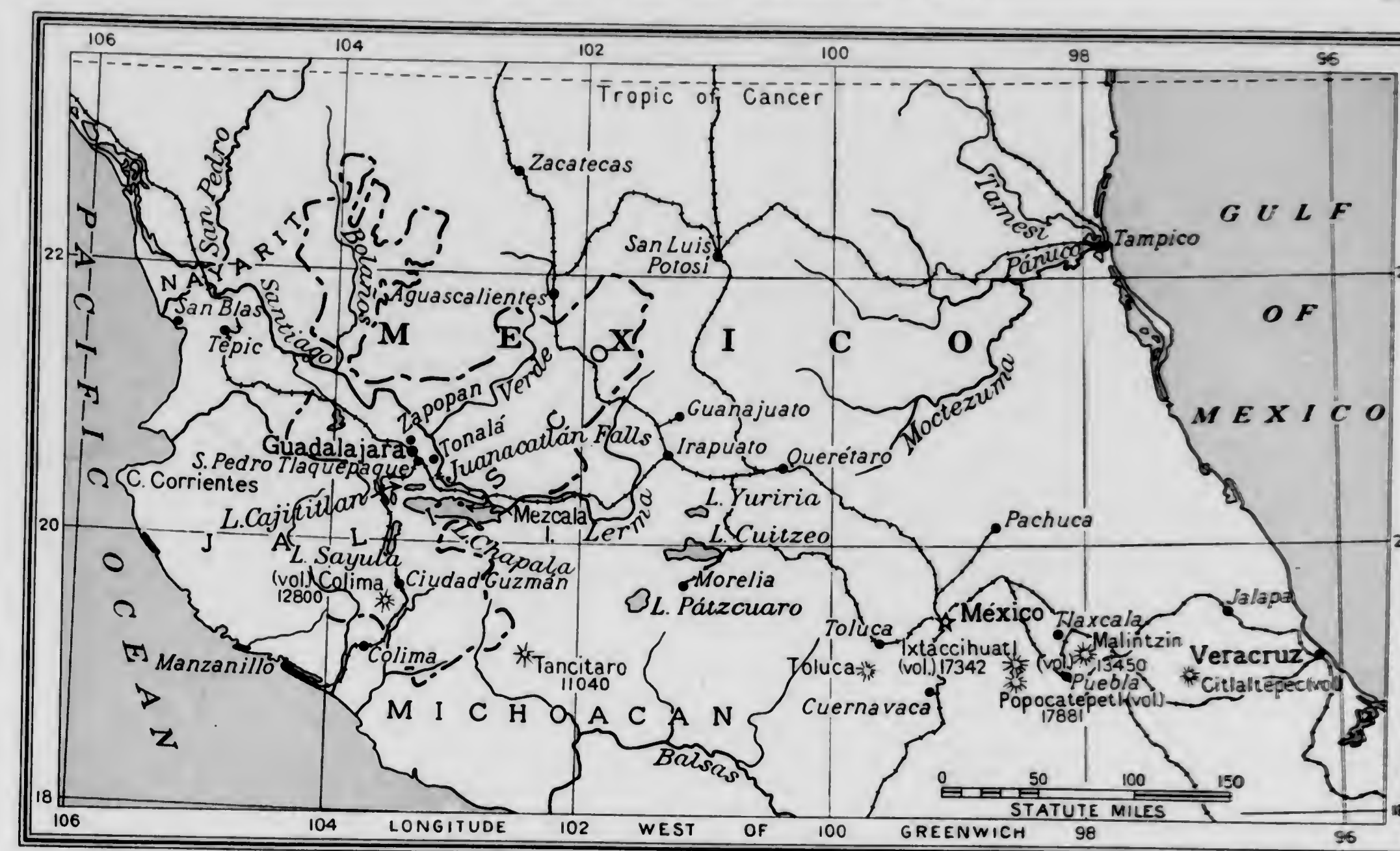
Workmen idly dug up the pavements, as always; traffic police in white gloves blew whistles and waved cars to stop. And they do stop; for one dispute with an alert



Photograph by Rautt

AN OXCART FLOAT LADEN WITH GREEN CORN IN A SPRING FESTIVAL

Peasants carrying baskets of plants and flowers, and wearing giant straw hats like chariot wheels, march in this street procession, which is symbolic of Nature's reward for man's toil.



Drawn by H. E. Holdstock

THE STATE OF JALISCO, WITH MORE THAN A MILLION PEOPLE, LIES IN THE VAST CENTRAL PLATEAU OF MEXICO

The western part of the State slopes away to the Pacific Ocean, which it borders for some 300 miles. With mountains, valleys, and hot coast lands, it enjoys a variety of climate, and is rich in mines and plantations which grow sugar, fruit, coffee, vanilla, and tobacco. Southeast of Guadalajara lies Lake Chapala, Mexico's largest body of fresh water.

Guadalajara traffic cop and the big jail yawns for you. On an open space soldiers were drilling and women waited before the colossal prison to get in at visiting hours. "They built the jail big enough to hold everybody in town, as a warning," is a local saying.

Through the suburbs we met more groups coming to work. In a flower garden a sandal-footed man was setting out young plants to make a fancy pattern of birds and flags.

IF YOU LIKE INDIAN POTTERY

From the tail of his big black dog, asleep beside him, an old Indian artist plucked a few hairs, twisted them deftly into his tiny, frayed brush, and resumed painting eyebrows on a clay head of Pancho Villa, master outlaw.

Other heads, new and shiny, stood on a board: Obregon, Carranza, George Washington, Henry Ford—and an American Shriner in a red fez.

Pose for your own bust, if you like, and watch your nose and ears form swiftly from the mud. In half an hour old Panduro (Hard Bread), famed Indian sculptor, makes a fair likeness (see Color Plate VII).

"This Guadalajara clay art is fragile and hard to ship," says a buyer from the States. "But it sells well. Not the busts so much, but these urns, vases, and water bottles, in old Aztec patterns. These dancing girls are good, too, in their wide skirts and big sombreros."

Around Tonalá village and the suburb of San Pedro Tlaquepaque, Indians have worked in clay from time immemorial. The Spaniards found them at it, making dishes for domestic uses, making idols, images, and figurines of men and beasts. Peons still cook in clay pots (see Color Plate VI).

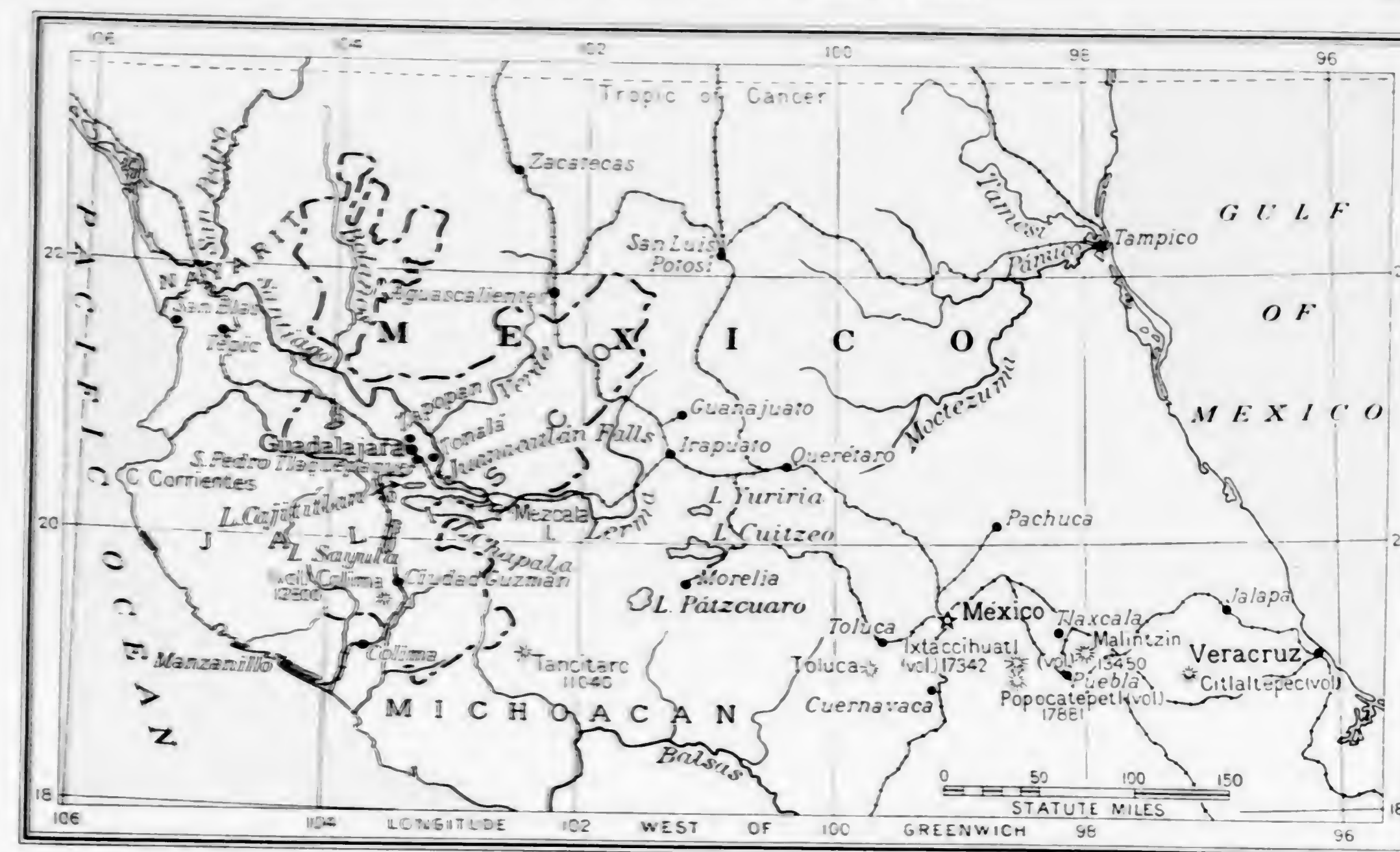
Untaught, and working far from the patter of studios and talks on art, these Indians produce excellent sculpture. Tiny pack mules, street hawkers, market women with chickens and baskets of fruit, vaqueros on rearing horses—all are formed and painted with fidelity to life. Sophisticated and erotic pieces also appear, with miniatures, ornaments, and vessels carrying a raised fretwork of deer, rabbits, ferns, or palms. A fat clay pig, hollow, with a slit in his back through which coins can pass, is much sold as a child's savings bank. Happily for the child, these figures break easily; all you have to do is drop them.



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Photograph from Anita Brenner

LOOK UPON THIS STATUE AND BE SAFE FOR ANOTHER DAY!

The figure of San Cristobal holding up a child is set on an outside corner of Santa Monica Church. There is a tradition that whoever looks upon it will be free from harm for 24 hours.

San Pedro Tlaquepaque, once the retreat of Spanish wealth and fashion, is linked with the city proper by tram, through an old customs gateway. Country people taking things into town to sell had to pay a tax in the old days to pass this gate. We rode the slow trams back to the main plaza. Like Times Square in New York, its scenes are forever shifting.

A tiny, bright-eyed nurse girl, certainly not more than ten, comes by, carrying a big fat baby. You feel the baby should get down, for a change, and carry the tired little girl. On the curb's edge, three soldiers are playing cards with a greasy deck. One man deals, calling "*Ocho de espadas*," eight of spades, and other faces as they turn up.

Gambling is not thought a vice. Men accost you, holding up yard-long strips of colored lottery tickets. You can buy a whole or part ticket. Such peddlers work on a commission for the official lottery, which holds regular drawings, is run in a strictly business manner, and devotes net profits to charities.

FIGHTING WITH THE KNIFE

Police appear dragging two disorderly men, one badly cut in a street fight. Certain knives here are made to fight with. Any battle-scarred mining or cow-ranch veteran will tell you he'd rather face a gun fighter than a Mexican trained with the knife. This business of knife fighting is full of fancy tricks. One is to throw the knife; another is suddenly to hit your opponent in the face with your hat, and then stick him while he's off guard. Defense work is equally skillful. The trained fighter wraps his serape around his left arm, or even grasps his big hat by the inside of the crown, using serape or hat as a shield, while thrusting with the knife. In "Old Mother Mexico," Harry Carr tells of a Mexican knife battle, fought to a draw, in which the heavy wool serapes were cut to shreds, but neither man hurt!

After the knifemen comes a boy leading a very skinny horse. "Play us a tune on your harp," shouts a clerk, a Mexican witicism implying that the horse is so bony his ribs look like harp strings!

Up the street past our hotel, late one night, came a squealing orchestra, preceded by three young men. One of this trio was celebrating his birthday. Hiring musicians to play in one's own honor is good form, in



Photograph by L. Pérez Parra

CHURCH STEEPLES AND BELFRIES PIERCE THE SKYLINE OF GUADALAJARA

The voice of the city is the clamor of its many bells. In the background rise the 200-foot-high twin pyramidal Byzantine towers of the Cathedral, begun in 1571.

keeping with established social practice. If you write a poem, win a horse race, or vanquish a rival, it is customary to hire a band and stroll from one *cantina*, or saloon, to another, or past the homes of your friends, with the music playing. Next day's papers may say, "Last night the orchestra of Juan de la Cruz played in honor of Señor Enrique Iturbe."

HAND-ORGAN MUSIC SUBSIDIZED

Here music seldom ceases, and most of it is good. This made me wonder how the many organ-grinders earn a living, till a missionary teacher explained: "They are subsidized by a fund willed to the city to insure free hand-organ music in perpetuity."

Mexican humor is grim. Late one afternoon, when a rain had made the streets slippery, I saw a dashing horseman in *charro* costume (see Color Plate I) exhibiting his equestrian skill before a saloon. He would ride a few paces up the street, then wheel his horse and dash back at full speed, suddenly jerking his curb bit so that his mount reared back on its haunches. In one such maneuver the animal fell over

backward and badly crushed its rider. He had to be hauled off in a carriage, but loafers before the saloon laughed and *cheered the horse!*

Into the plaza one morning came an Indian boy with a vicious bobcat in a flimsy wooden cage, set on a cart. He wanted to sell the snarling cat, which growled, spat, and bit at sticks poked at it by bootblacks. Several girls, on their way to work, stopped to watch. Then along came a dandy, in patent-leather shoes and white-duck pants, fragrant with perfume.

"Nothing but a short-tailed cat!" he announced boldly, showing off before the señoritas, who kept back from the cage. "What are you afraid of?" And he made a gesture as if to slap a paw that protruded through the bars. Quick as lightning the cat slapped back, its sharp claws laying his finger open in a deep, long cut. He stared foolishly at the gushing wound, then sat down on the pavement and fainted. Everybody laughed and called the cat brave. Finally an old woman who peddled flowers roused the fallen "lion tamer," as the crowd now dubbed him, and wrapped up his finger.



Photograph from Anita Brenner

LOOK UPON THIS STATUE AND BE SAFE FOR ANOTHER DAY!

The figure of San Cristobal holding up a child is set on an outside corner of Santa Monica Church. There is a tradition that whoever looks upon it will be free from harm for 24 hours.

San Pedro Tlaquepaque, once the retreat of Spanish wealth and fashion, is linked with the city proper by tram, through an old customs gateway. Country people taking things into town to sell had to pay a tax in the old days to pass this gate. We rode the slow trams back to the main plaza. Like Times Square in New York, its scenes are forever shifting.

A tiny, bright-eyed nurse girl, certainly not more than ten, comes by, carrying a big fat baby. You feel the baby should get down, for a change, and carry the tired little girl. On the curb's edge, three soldiers are playing cards with a greasy deck. One man deals, calling "*Ocho de espadas*," eight of spades, and other faces as they turn up.

Gambling is not thought a vice. Men accost you, holding up yard-long strips of colored lottery tickets. You can buy a whole or part ticket. Such peddlers work on a commission for the official lottery, which holds regular drawings, is run in a strictly business manner, and devotes net profits to charities.

FIGHTING WITH THE KNIFE

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Photograph by L. Pérez Parra

PUBLIC LETTER-WRITERS AT THEIR OPEN-AIR STAND BEFORE THE GUADALAJARA POST OFFICE

Leaning over the table a countryman is signing a letter to his family, just prepared by the professional letter-writer, who furnishes paper and stamps, and charges a small fee (see opposite page).



Photograph by Clifton Adams

A SKIN PEDDLER PUTS OUT HIS LIVE DECOY

Every Guadalajara visitor is struck by the number of street fakirs and the variety of odd and interesting things they sell. This captive wild animal is the *tlacuache*, a nocturnal, fox-faced, opossum-bodied creature. It uses its toes as workmen use pincers.

In the open street, not far from the big post office, a man sat writing, his typewriter balanced on a wooden box. Around him a few men and a woman stood watching.

THE PUBLIC SCRIBE USES A TYPEWRITER

"That is a public scribe," said my companion. "If you can't write, but would like to collect a bad debt by mail, or ask for a job in another town, you go to this man. He is like a public stenographer in the States, except that he composes everything he writes; then reads it back to you. He even makes love for you by mail, in prose or poetry" (see opposite page).

Think of a poor girl reading with bated breath a tender message from a gallant lover—a message whose emotional phrases are all synthetic, merely run-of-the-mill sentiments from a professional writer of love letters—at a penny a line!

Poetry-making is prodigious. An old saying is that you can't throw a rock in Guadalajara without hitting an artist, and that there aren't enough rocks with which to hit all the poets.

I recall riding in a day coach from Irapuato into Guadalajara when an Indian boy with a guitar sang and resang one song, about a white dove, for almost the whole afternoon. It had more verses than "Frankie and Johnnie." About dark, passing a village, somebody fired several shots at us, smashing car windows and scattering glass. We all ducked to the floor.

"They missed the Indian Caruso," moaned an American soap salesman in



Photograph by Luis Márquez

DON'T MISTAKE THIS HUICHOL BRAVE FOR A WOMAN

Often seen in Guadalajara on market days, primitive Huichol Indians, dark brown, not red, come from the wild hill regions of the adjacent State of Nayarit. They still use bows and arrows, and trap deer with nets. They play flutes ornamented like a rattlesnake's tail, make drums of hollow logs, and carry eagle feathers to ward off evil.

mock regret, as he rose, brushing car-floor dust from his blue suit.

Wearily, as if at a daily task that bored him, the porter came with broom and dustpan and swept up the broken window glass. Again the *tequila* bottle was passed, music-loving travelers resumed their group about the Indian boy, and the refrain, "Paloma Blanca—Blanca Paloma," the white dove, was sung all the way in to Guadalajara!

One blind man in the plaza played a clumsy harp, plainly a home-made affair. His repertoire seemed infinite—everything from such popular Mexican songs as "Cielita Linda" and "La Golondrina" to



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TONALÁ, WHERE DE GUZMÁN'S ARMY WAS TREACHEROUSLY ATTACKED BY WARRIORS OF THE NATIVE QUEEN DURING A BANQUET OF WELCOME

This plaza, faced by the church and set with a bandstand and shade trees, is typical of all Mexican villages where people gather for recreation. In the foreground a sandal-footed peon drives his firewood-laden burros, the common carrier of the country (see text, page 344).

long ballads about train wrecks, bull-fighters, strikes in the mines, cane-field fires, "Farewell to Zapata," and one rousing song about Pancho Villa, called "Adelita," which reminded me of the old Missouri themes on Jesse James.

"PLAYING THE BEAR" SURVIVES

Everybody who works at a trade may be called a "maestro"; even the tailors and carpenters are "masters." So, of course, is the composer of ballads. Yet the printed music of even the better-known ballads is often hard to find. "We haven't got it; but we can have it copied for you," says the shopkeeper.

Despite the many ghost writers of love letters and all the poets' amorous versifying, love-making itself is a very involved technique in Guadalajara.

One young lady, says a Guadalajara story, lived on a second floor. To facilitate his long-distance wooing, her gallant

sent her a portable telephone. As he appeared each evening, she let one end of the wire down to him. This worked at first. Then, one fatal night, the lover appeared only to find a rival on his end of the wire!

Shop windows full of roller skates and bicycles, footballs, boxing gloves, baseballs, tennis, and other sporting goods tell their own story. Out at the golf course, laid out on the army aviation field, girls may play when guarded by duennas or chaperons. Boys on the tennis courts or the baseball diamond shout and "root" in Spanish, but use English terminology to call the scores and the plays. Guadalajara likes to play; and the halcyon days of ease, when young men were content to stroll through the parks at band-concert time and flirt with the girls, or spend their Sunday afternoons at the bull ring, are passing fast.

The bull ring is here, of course; but such sports as boxing, football, and baseball have robbed it of old-time popularity.



FLICKING HIS TURKEYS ON THE NECK WITH A LIGHT LASH, THE BOY HERDS THEM THROUGH THE STREETS



Photographs by L. Pérez Parra

PAPER, NOT MACARONI OR THE FAMILY WASH, FESTOONS THE STREETS

The gala dress is in preparation for religious celebrations held each December. Well-swept, sprinkled streets are characteristic of Guadalajara, known as the cleanest city in Mexico.



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Photographs by L. Pérez Parra

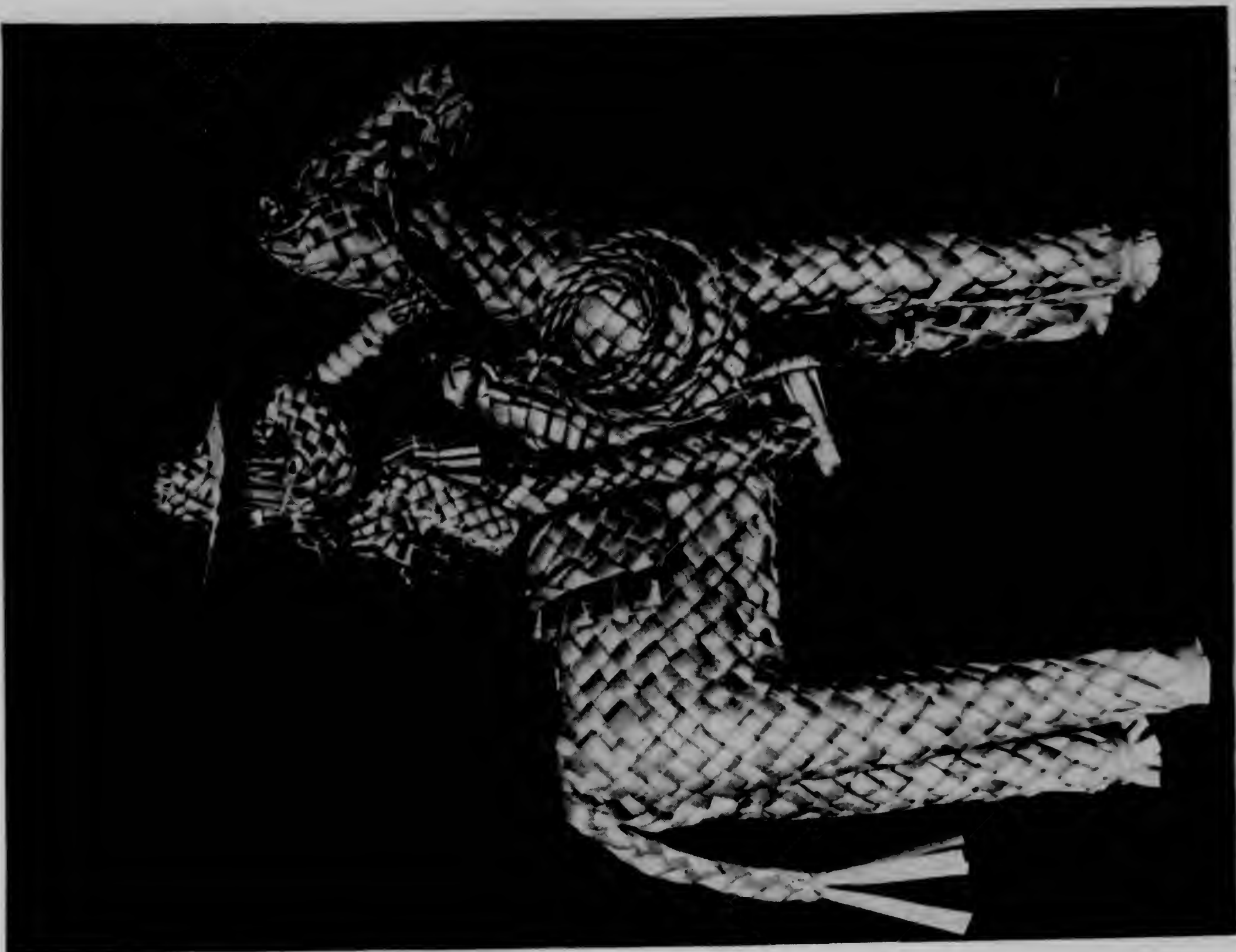
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AN INDIAN WOMAN PREPARES RUSHES FOR WEAVING A MAT

Since Aztec times Mexico has used the straw mat, or *petate*, most common of all household objects. From the cradle to the grave, even in folklore and proverbs, it figures in the daily life of every peon (see text, page 355).



Photograph by International News

WEEDS AND STRAW WERE USED TO CREATE THIS HORSEMAN

Though Mexican peons may not have heard of modernistic art, the crude toys they make are widely popular among children below the Rio Grande. This realistic rider, with his lasso and holster, is blowing a bugle.



Photograph by L. Pérez Parra

NETS ARE STRUNG UP, LIKE CHICKEN-WIRE FENCE, TO DRY BESIDE LAKE CHAPALA

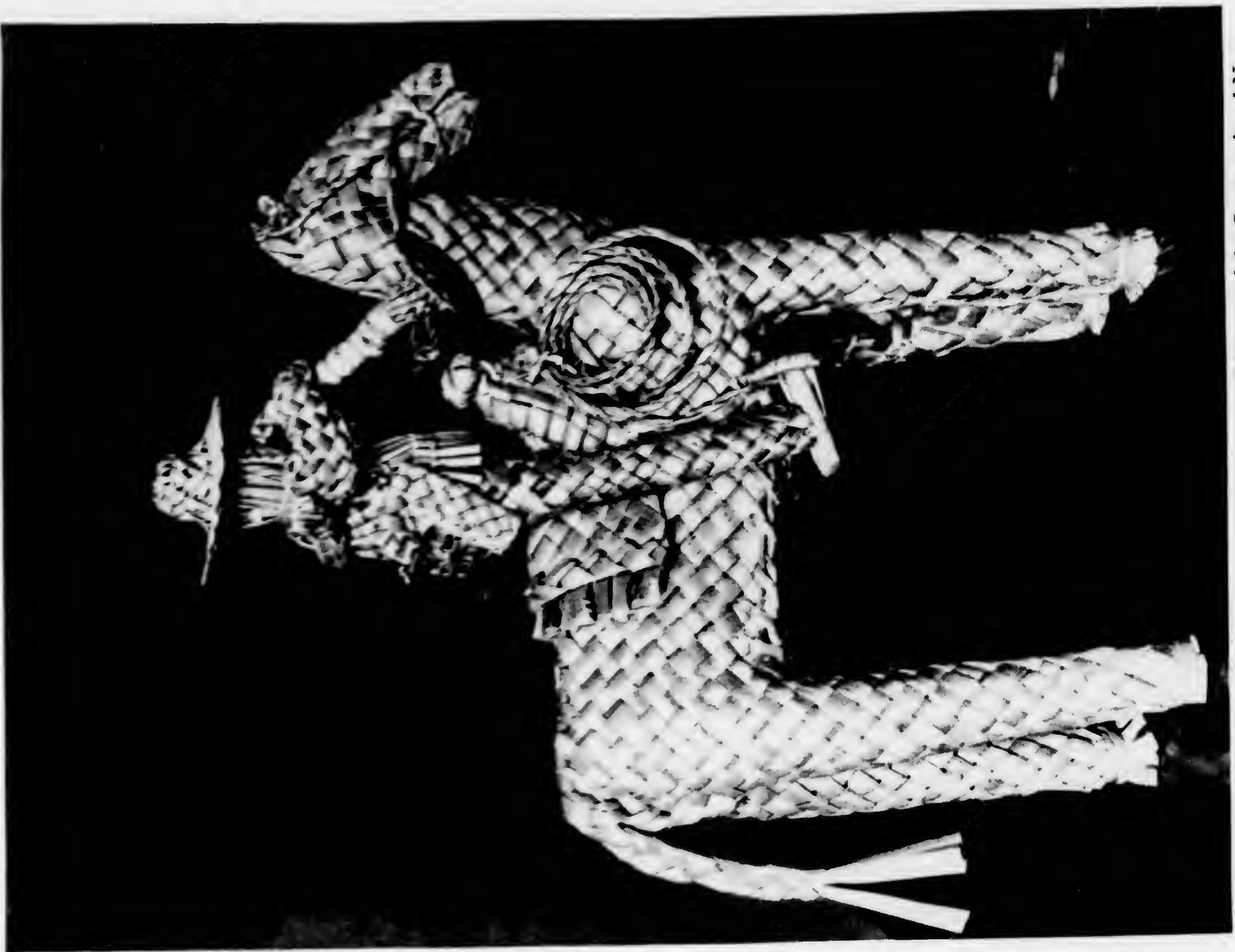
Crudely made, open wooden boats have mat awnings to protect their cargoes of fresh fish from the sun. Since Aztec times fish have been taken from Chapala, Mexico's largest fresh-water lake. About its shores are many pleasure resorts and villas, built by wealthy citizens of Guadalajara and Mexico City (see text, page 353).



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Retake of Preceding Frame



Photograph by O. B. Hachenberger

MEXICANS FLOCK TO THEIR NIAGARA, SCENIC JUANACATLÁN FALLS

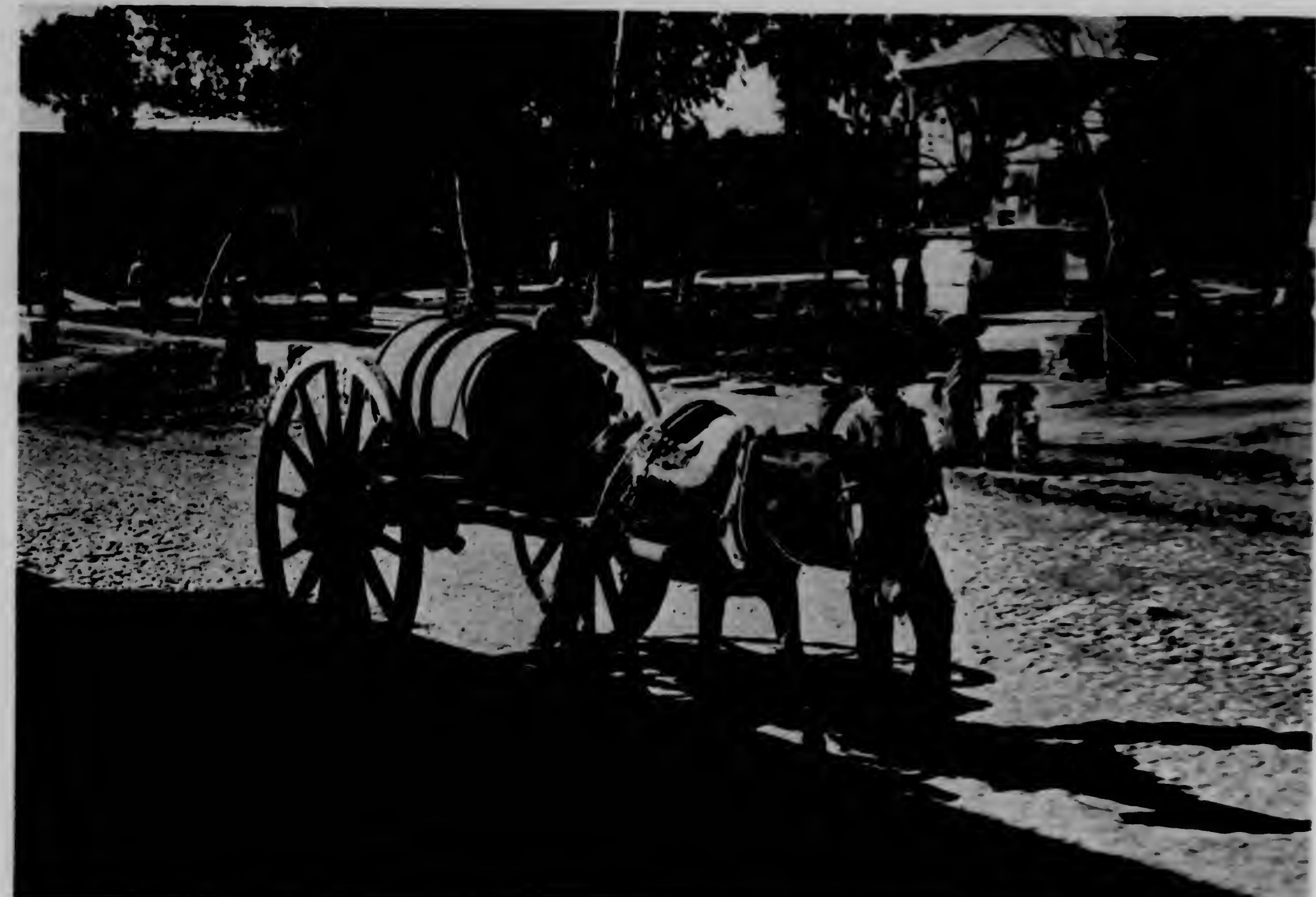
Here, on the Santiago River, a hydroelectric plant provides Guadalajara with light, heat, and power, and also supplies many near-by towns and mining camps. The falls attract numerous sight-seers and picnic parties (see text, page 353).



Photograph by L. Pérez Farra

USING A KANAKA-LIKE HAND NET, WEIGHTED WITH LEAD, A FISHERMAN CASTS FOR SMALL "CHARAL" FISH

Years ago a well-meaning man placed water hyacinths in Lake Chapala. They have become so thick that they clog launch propellers and resist all plans for their extermination. Corn, coffee, grain, fruit, and live stock are raised on haciendas along the lake shore.



Photograph by L. Pérez Farra

TONALÁ HOUSEWIVES BUY THEIR DRINKING WATER FROM THIS PEDDLER

The carrier's iron-tired cart, rattling over the cobblestones, is fitted with an old metal drum for holding the water. Underneath the axle hangs the jar with which water is measured out to customers.

Despite its continuous appeal to the peon, who glories in its cruel, gory combats, and the survival of a few other habitués, bull-fighting as a business is on the decline.

Bulls from Spain are still sent to Mexico City, where tourists help support the arena, and some fighting animals are still raised on the West Coast ranches for Guadalajara. One of these is the old Rancho San José de Condé, in Nayarit, which dates from 1550. It is one of America's oldest ranches. Its output of small, black, savage bulls went on for generations. To perpetuate the fighting instinct, the rule on this ranch was "Kill every bull calf that does not seem to hate men." Such a plan insures a bull ferocious as any wild animal. One young bull on this ranch chased a vaquero up a tree and kept him treed till he nearly died of thirst.

SHOOTING JUDAS IN EFFIGY

A dummy man, in top hat and morning coat, in a general's uniform or merely in rags, may hang from any telephone wire, as you walk the streets at Easter time.

Suddenly the effigy explodes, from a small bomb hidden within, and bursts into flame. Then the street crowd laughs and yells, and maybe even shoots at the effigy, which is supposed to represent Judas. Burning him in effigy, at this time, is a Mexican practice. Sometimes "Judas" is stuffed with bananas or candy which fall out when he blows up, and street urchins scramble for the treat.

"Buy your dead man's bread here," a baker's sign may read around All Souls' Day. At that time, some Mexicans believe, the spirits of departed relatives return to dine with their families. The dining table becomes an altar, and some foods are served in strange shapes, such as candy skulls, big and little, with cherries for eyes, ribs and leg bones made of chocolate, or cakes baked in the form of coffins.

Many churches in Mexico were built on the sites of ancient Aztec temples, the heads of whose idols were cut off by zealous Spaniards. In some churches fragments of heathen idols are built into the walls. After the conquest, Spain built literally thousands of Mexican churches. They dominate Gua-



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Photograph from Aztec Art S. A.

WITH SLENDER, SUPPLE FINGERS AN ARTIST SHAPES A VASE UPON HIS WHIRLING POTTER'S WHEEL

Guadalajara's famous pottery is made in the suburb of San Pedro Tlaquepaque. Indian artists who design it all come from the near-by ancient village of Tonalá (see Color Plate VI).

dalajara. From here the padres marched, building missions all the way to California.

The chief edifice here is the Cathedral; its twin towers rise over the city, visible for miles. On feast days long strings of lights illuminate the towers, and at Easter the Bishop washes the feet of twelve old men, chosen at random from street crowds.

Horses and rebels were housed in some of these churches, with priests and nuns deported during the revolutions. I saw one string of cattle cars reach the American border with priests standing in the cars. But the faithful carried on. Pious peons came for miles on their knees to the churches. Old women, shouting the chants and litanies or counting their beads, crawled to the altars on stiff old knees. Girls knelt with crowns of thorns on their brows, and small boys clutched at the crucifixes.

From Guadalajara out to the suburban church of Zapopan is but a short trip by tramcar; but during an August feast peons hobble out to it on their knees, taking all day. When prayers are over they stage a costume play depicting the Spanish con-

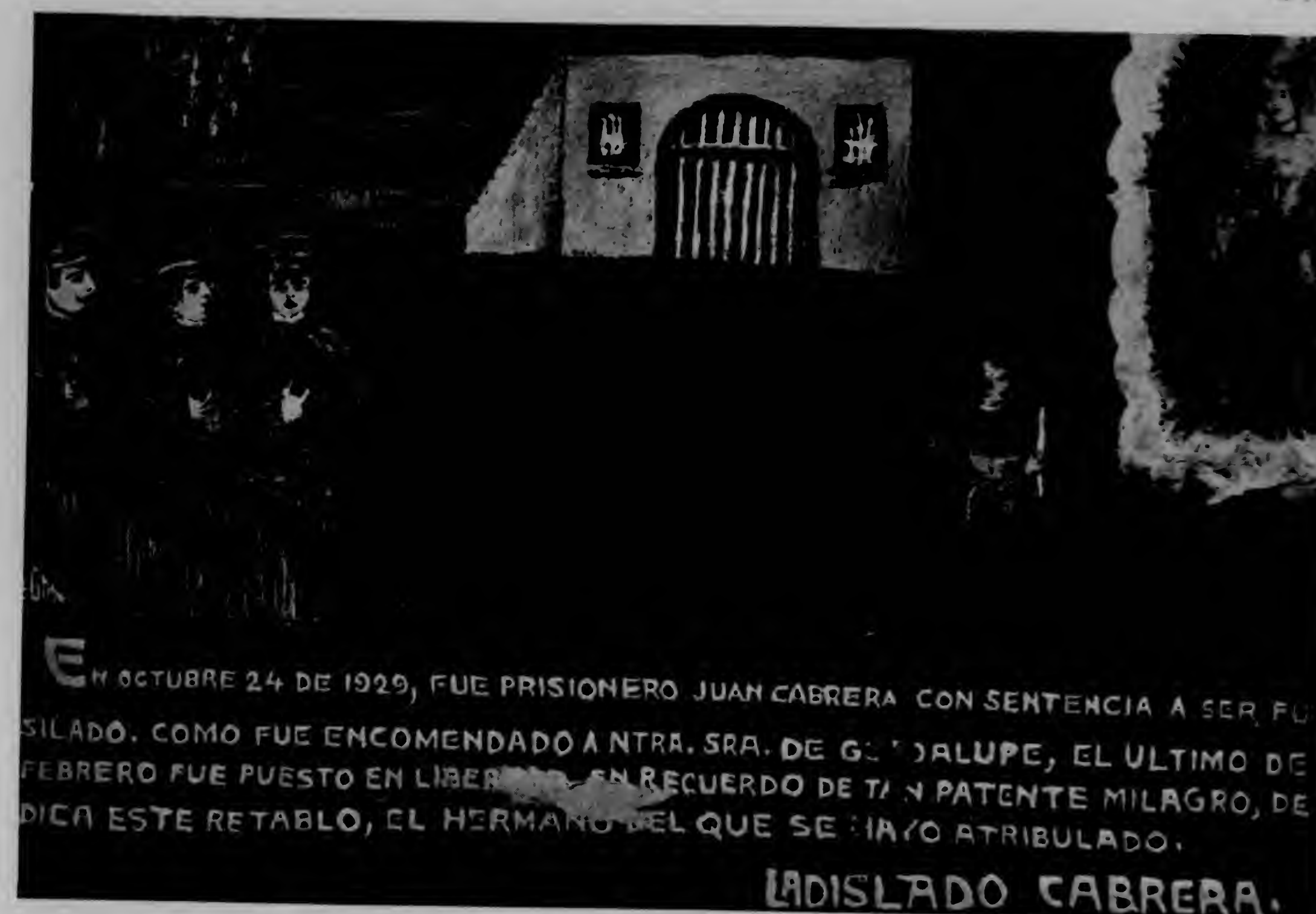
quest of Jalisco. Then Indian players dress and act the parts of Spanish knights and the local Indian characters of that conflict (see Color Plate IV). In recent years education has been taken away from the Church, and the new generation tends to abandon these mimetic dances and dramatic rituals.

Rushing to aid the King of Spain in the Peninsular War went many men of Guadalajara. Legend says money was sent, too, raised by melting gold and silver plate and candlesticks from the Cathedral. In gratitude the King gave this church Murillo's great painting, "The Assumption of the Virgin," still here in the Cathedral, though many attempts have been made to buy or purloin it.

SCIENCE TEXTS AND MUSTY MANUSCRIPTS

The public library, housed in one church, has stacks of huge leather-bound books, ancient manuscript histories of Mexican exploration, books on the arts and sciences, and copies of the classics, often in several languages.

"What are all these men and boys read-



Photograph by O. B. Hachenberger

THIS "MIRACLE PAINTING" COMMEMORATES ITS OWNER'S ESCAPE FROM THE FIRING SQUAD

The inscription says, "On October 24, 1929, prisoner Juan Cabrera was under sentence to be shot. Because he was recommended to Our Lady of Guadalupe, the last of February he was liberated. In memory of such a manifest miracle his brother dedicates this altar piece" (see text below).

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Dialogue among those who lounge on plaza benches is spiced with life's problems. I talked with one ex-circus man who said he was unemployed because of the movies. "The pictures ruined my family," he sighed. "We worked together as a troupe, playing the fairs and *fiestas*. I walked the tightrope and threw knives at my wife. Now the crowds prefer the cinema."

Carrying paint box and brushes, a long-haired youth in flowing tie halted near us for a shoe shine. "He's a miracle painter," said my companion. "His is an odd calling. If, for example, you are saved, in a way that seems miraculous, from death in a train wreck, an earthquake, or at the hands of assassins, you call in a miracle painter. You describe your peril and deliverance to him, and he paints a picture of the scene in all its details."

Wounded in the battle of Celaya, General Obregon, later President, had to have an arm amputated. He was photographed on the operating table, and in a book he wrote afterward the picture was reproduced. Photographs of funeral processions and even of dead children are not uncommon.

The arcades that shade the sidewalks before stores facing the plaza shelter many street venders. A hat peddler walks majestically along, with 15 or 20 hats for sale, stacked on his own head, one atop the other, like a pagoda. Another carries a long string of sandals. Some are of straw, others of rawhide, and a few made from old automobile tires cut into soles. Country peons usually wear baggy white drawers; but custom now decrees that this badge of rural servitude shall not be worn in Guadalajara streets. So, at the edge of the city, "Pants Shops" are open where trousers may be rented. Just check your drawers there and rent a pair of pants, as impecunious American students may rent evening clothes for a party! Changing sartorial



Photograph from Aztec Art S. A.

WITH SLENDER, SUPPLE FINGERS AN ARTIST SHAPES A VASE UPON HIS WHIRLING POTTER'S WHEEL

Guadalajara's famous pottery is made in the suburb of San Pedro Tlaquepaque. Indian artists who design it all come from the near-by ancient village of Tonalá (see Color Plate VI).

dalajara. From here the padres marched, building missions all the way to California.

The chief edifice here is the Cathedral; its twin towers rise over the city, visible for miles. On feast days long strings of lights illuminate the towers, and at Easter the Bishop washes the feet of twelve old men, chosen at random from street crowds.

Horses and rebels were housed in some of these churches, with priests and nuns deported during the revolutions. I saw one string of cattle cars reach the American border with priests standing in the cars. But the faithful carried on. Pious peons came for miles on their knees to the churches. Old women, shouting the chants and litanies or counting their beads, crawled to the altars on stiff old knees. Girls knelt with crowns of thorns on their brows, and small boys clutched at the crucifixes.

From Guadalajara out to the suburban church of Zapopan is but a short trip by tramcar; but during an August feast peons hobble out to it on their knees, taking all day. When prayers are over they stage a costume play depicting the Spanish con-

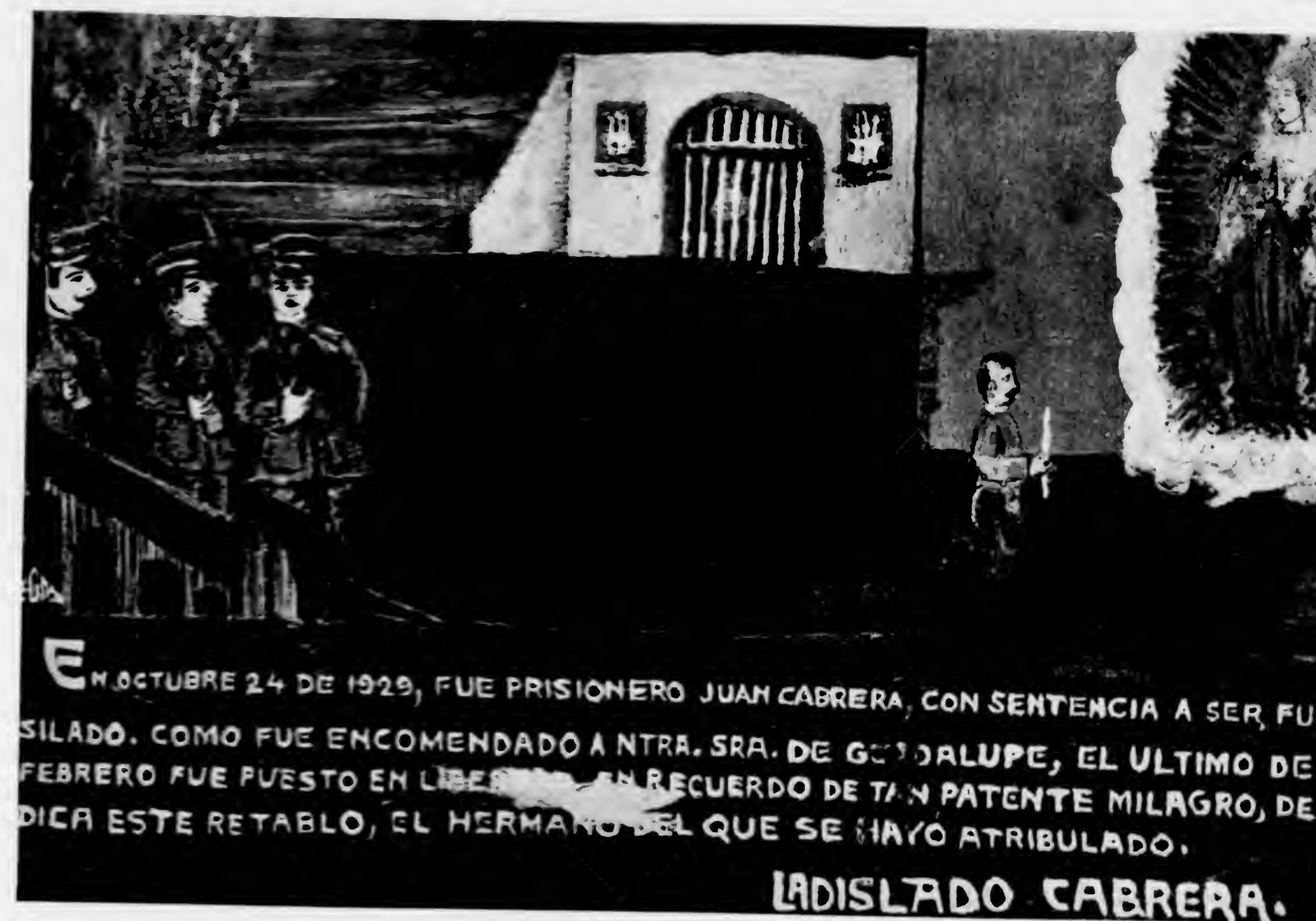
quest of Jalisco. Then Indian players dress and act the parts of Spanish knights and the local Indian characters of that conflict (see Color Plate IV). In recent years education has been taken away from the Church, and the new generation tends to abandon these mimetic dances and dramatic rituals.

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standards, however, are destroying this simple industry.

One Indian arrives with a basket of assorted fruits, guavas, gourds, tiny lemons, cactus pears and mangoes. On the pavement he arranges little piles—one kind of fruit here, another there; then he squats down, silently awaiting buyers. If you want fruit, buy it, but don't ask questions.

Toys, candies, soft drinks, post cards, newspapers, pottery, medallions of the saints, small green melons white on one side like a fish's belly—everything from mule gear and old tools to carved-wood sticks ending in ornate filigree balls for stirring chocolate—are spread out for sale on the sidewalk.

Inside the large stores, of course, is modern merchandise. Some American women, wise in local ways, say that if the stores don't carry the particular hat or gown they wish, clever native women soon make them—copying, if need be, from no more than a picture from an American fashion journal. Most lingerie, dress goods, millinery, soaps, perfume, and jewelry are sold by French merchants. Machinery, hardware, and such heavy goods are usually handled by Germans.

Few Americans are found in retail trade; they, with the British, are more interested in mines, ranches, power plants, railways, or banks.

GUADALAJARA IS A MOORISH NAME

If you buy any sizable article in a store, the merchant whistles up a street porter to carry it home for you. Persons of position would lose caste carrying a big parcel through the streets. Porters even carry big bags of silver coin to and from the banks—and for some reason are seldom molested.

When Cortez conquered Montezuma and founded "New Spain," he had with him one Don Nuño de Guzmán, who soon rose to power and grew jealous of his chief. Eager to gain more honors and riches for himself, De Guzmán, in 1529, quit the Aztec capital, with picked Spanish troops and many Tlaxcaltecan Indian allies, to explore the unknown regions farther west and north.

Nearing Lake Chapala, De Guzmán met and killed the powerful King Caltzontzin, robbed his subjects of much gold, and then pressed on toward where Guadalajara now stands. Near here a romantic native

queen, impressed by her first sight of white men, horses, and the sound of cannon, winced and dined the Spaniards, giving them, among other products of the country, rabbits, venison, turkey, quail, honey, and fruits. She even sent forth her fairest handmaidens, decked in flowers and colored feathers, to sing and dance; but soon this reception, too, ended in battle, begun by jealous Indian warriors.

NEARLY A CENTURY BEFORE JAMESTOWN

This was the Kingdom of Tonalá, still the name of a small town near Guadalajara. Exploring farther, De Guzmán and his lieutenant, Cristóbal de Oñate, came upon a huge Indian stronghold, Nochistlan. Fighting ensued, and near by the Spaniards built their camp, a cluster of huts. Though moved about later to various neighboring sites, a town was laid out about 1530. It was named for De Guzmán's home town in Spain, Guadalajara, from the Moorish Wad-al-hajarah, meaning River of Rocks. From the King of Spain the new town got its coat of arms in 1539; so it was really a white settlement nearly a century before the English landed at Jamestown.

For decades warlike Indians harassed the white settlers, even as did their red brothers from Massachusetts to Arizona. Alvarado, another famous officer of the Cortez legions, died here from Indian wounds. By 1560 Guadalajara had become important. Its chief activity was Indian slave hunting, and the driving of these to work in the gold and silver mines. Vast fortunes were thus amassed, luxurious homes were built; and New Galicia, of which Guadalajara was the capital, then included not only the present State of Jalisco, but much of what is now five or six other Mexican States, reaching up to Sinaloa.

Army officers, bishops, and priests were supreme. One curious scruple of early days made it illegal for any man to hold office who was a heretic, had Moorish blood, or who had been found guilty by the Inquisition.

When the English took Havana, in 1762, Guadalajara sent many troops to help hold Spain's New World colonies. Only a few decades later this same colonial seat of power was to raise its own regiments, go afield against Spain, and help win Mexican independence in 1821.

Visit certain old Guadalajara family homes now and you are astonished at the

THE GLAMOUR OF MEXICO—OLD AND NEW



© National Geographic Society

Natural Color Photograph by L. Pérez Parra

THESE FANCY COSTUMES ARE MUCH WORN ON MEXICAN HOLIDAYS

The man wears the Mexican costume of gentlemen riders, known as the *charro*. In wide-brimmed sombreros, sashes, and skirts of ornate pattern, the girls are clad in the fancy dress popularly associated with riding; but in actual practice few of the women are equestriennes.

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NO MODERN MACHINE METHODS MENACE THIS FARMER WITH A SURPLUS CROP!

The peon holds his crude plow in one hand, and wields his ox goad with the other, on a farm between Lake Chapala and Guadalajara. Many large haciendas use tractors, steam plows, and other modern implements.



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Natural Color Photographs by L. Pérez Parra

THIS COW'S HIND LEGS ARE TIED TOGETHER SO SHE CAN'T KICK THE MILKER, WHO IS ON THE "WRONG" SIDE!

Wild range cattle are descended from Spanish cattle imported generations ago. This dairy herd is half-breed, obtained by crossing range cows with bulls from the United States.



PALMS LINE THE PARK OF A NEW SUBURB TO OLD GUADALAJARA

The Modern Colony is a handsome residential district. Wealthy Mexicans, and some foreigners, are settled here, but many conservative old families still cling to their huge, barred houses and high-walled courts in the city.



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Natural Color Photographs by L. Pérez Parra

LOCAL INDIANS WERE MAKING CLAY UTENSILS LIKE THESE WHEN CORTEZ'S MEN FIRST EXPLORED JALISCO

Housewives and servants come here to buy kitchen utensils, bowls, ollas, flowerpots, and other pottery ware. The building in the background is one of the Guadalajara public markets.



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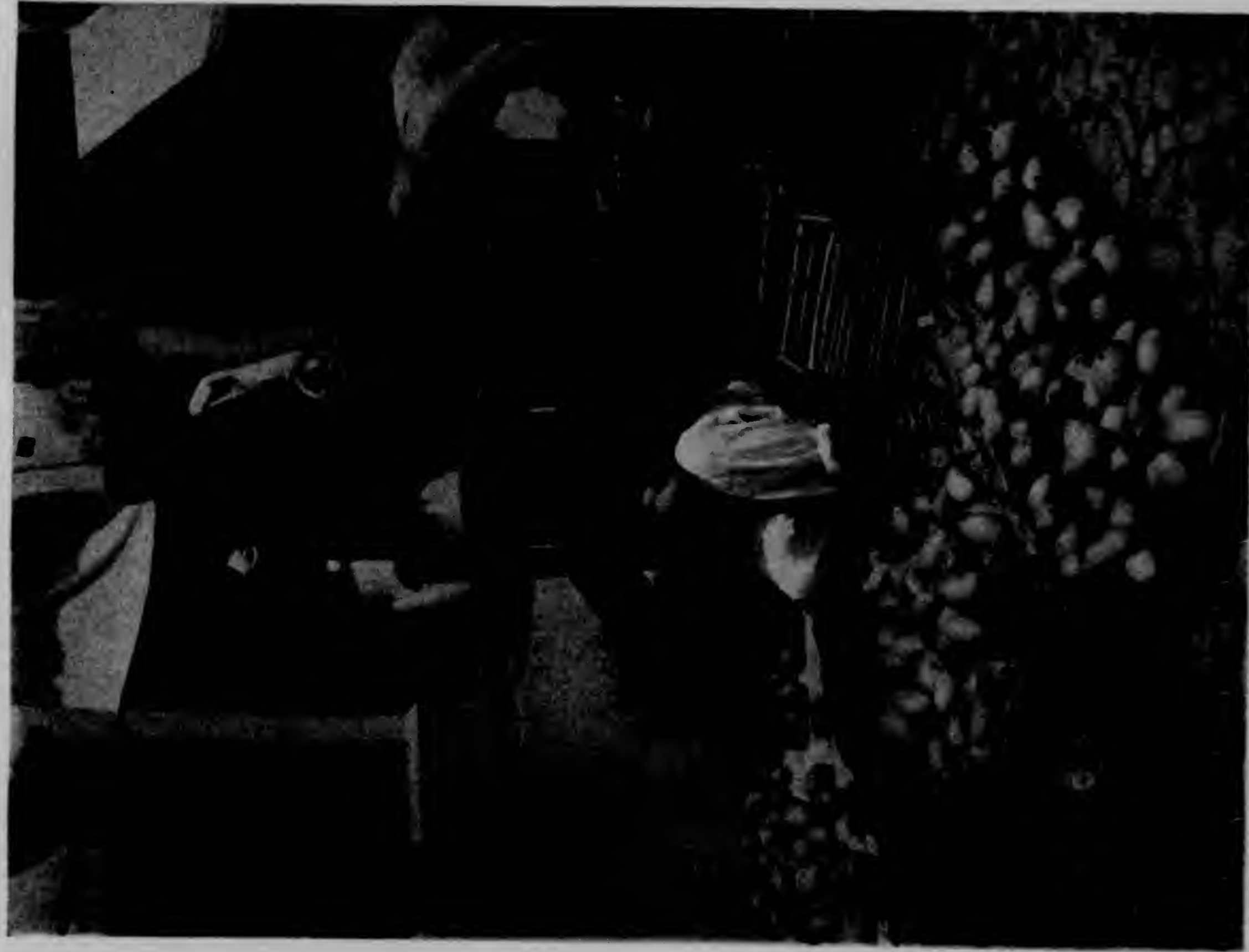
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Retake of Preceding Frame



© National Geographic Society

BURROS PACKED THESE MANGOES 20 MILES TO MARKET

Mangoes ordinarily grow to the size of a large pear. When ripe they are a rich yellow color mottled with red. The mango grows abundantly in this latitude and is much relished.



Natural Color Photographs by L. Pérez Parra

A FIESTA REËNACTS SCENES FROM THE DAYS OF THE CONQUEST

Staged annually before the Zapopan church, near Guadalajara, dancers dress as did Indian allies of the Spaniards who conquered this region. Participants prolong this ceremony till they frequently fall exhausted.



© National Geographic Society

THIS ARISTOCRAT OWNS A PLANTATION NEAR LAKE CHAPALA

Riding a big-horned Mexican saddle, and in typical Jalisco gentleman rider's dress, the caballero is off to inspect his cornfields and cattle ranges.



Natural Color Photographs by L. Pérez Parra

HIS BLANKET AND BIG STRAW HAT MARK HIM AS A PEON

Peons are plantation, mine, and cattle-ranch workers. Though Spanish is Mexico's common language, many of her Indians have not yet learned it.

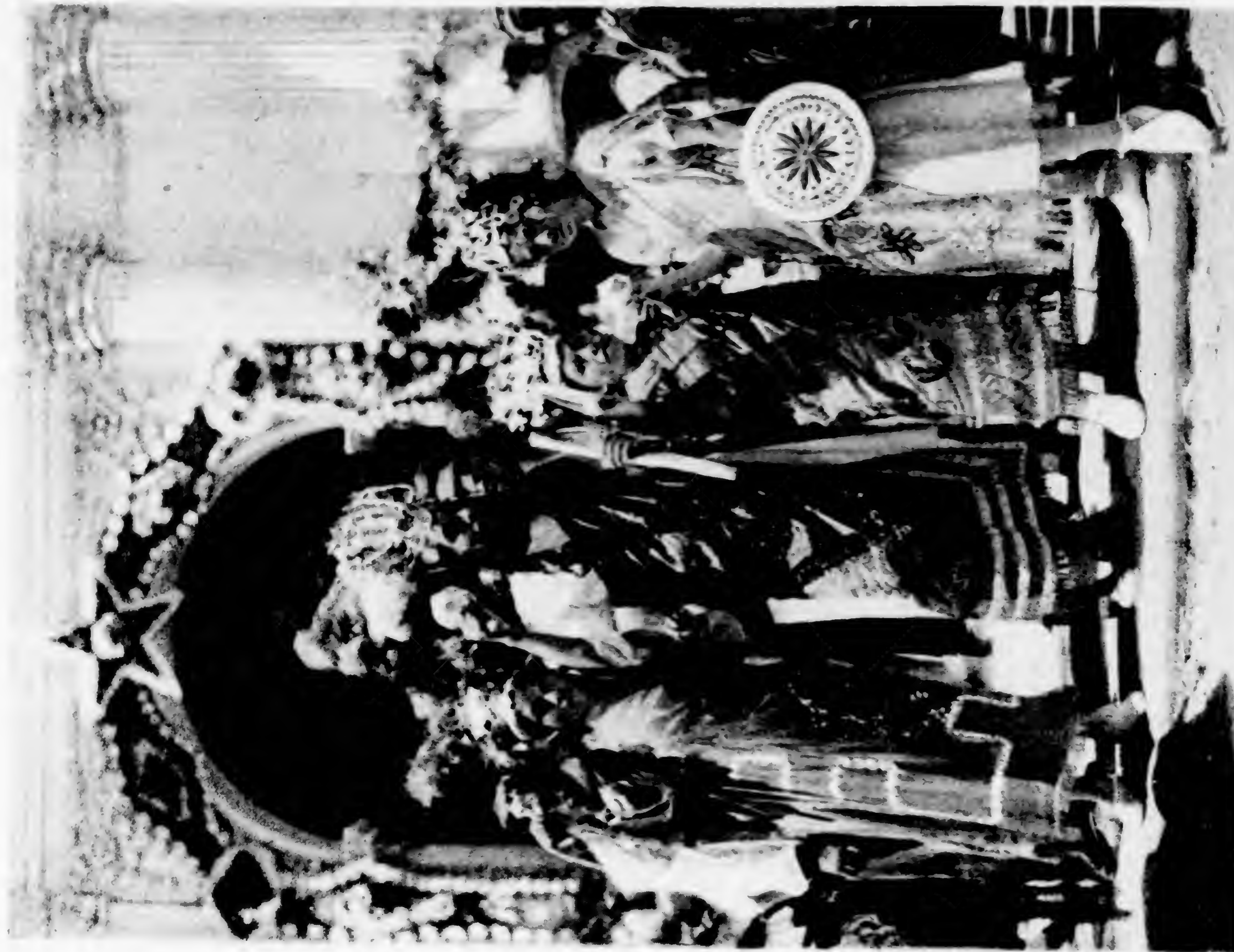


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© National Geographic Society

Natural Color Photograph by Aztec Art, S. A.

TONALTECAN INDIANS PAINT POTTERY IN OLD AZTEC DESIGNS

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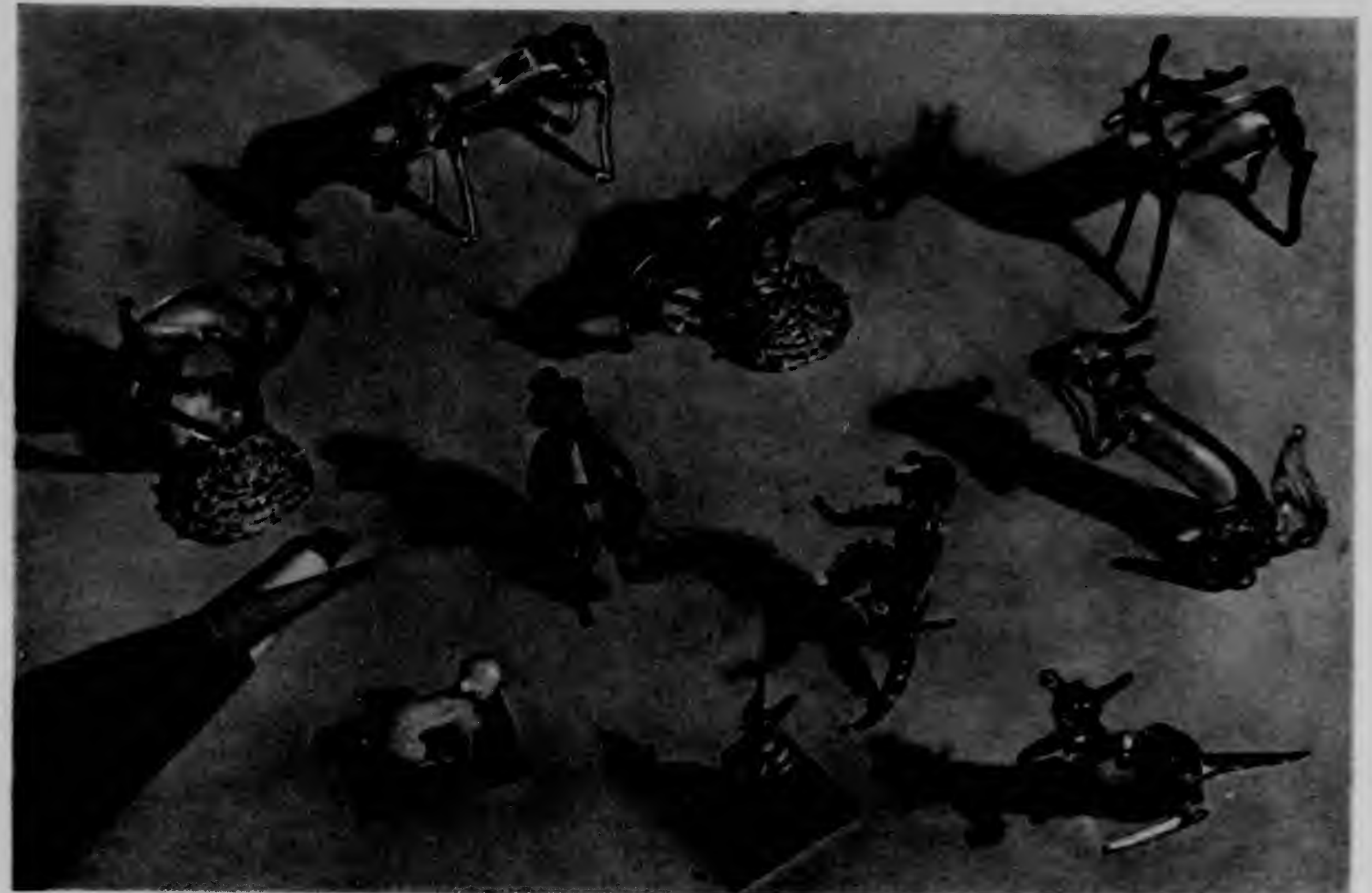


© National Geographic Society

Natural Color Photograph by L. Pérez Parra

DECORATING LEATHER-COVERED CHAIRS AND TABLES

These sun-parlor or corridor sets of four chairs and a table are made of split saplings covered with pigskin. When new they smell of green leather, and white ants often attack the wood, but the chairs are springy and comfortable. The artist is painting the Aztec calendar on the table top.



© National Geographic Society

Natural Color Photograph by Charles Martin

A MINIATURE ZOO BLOWN IN COLORED GLASS

The manufacture of tiny and fantastic glass creatures has become a lively young industry. The size of these figures, posed about the saxophone player as if listening, is indicated by the pencils.

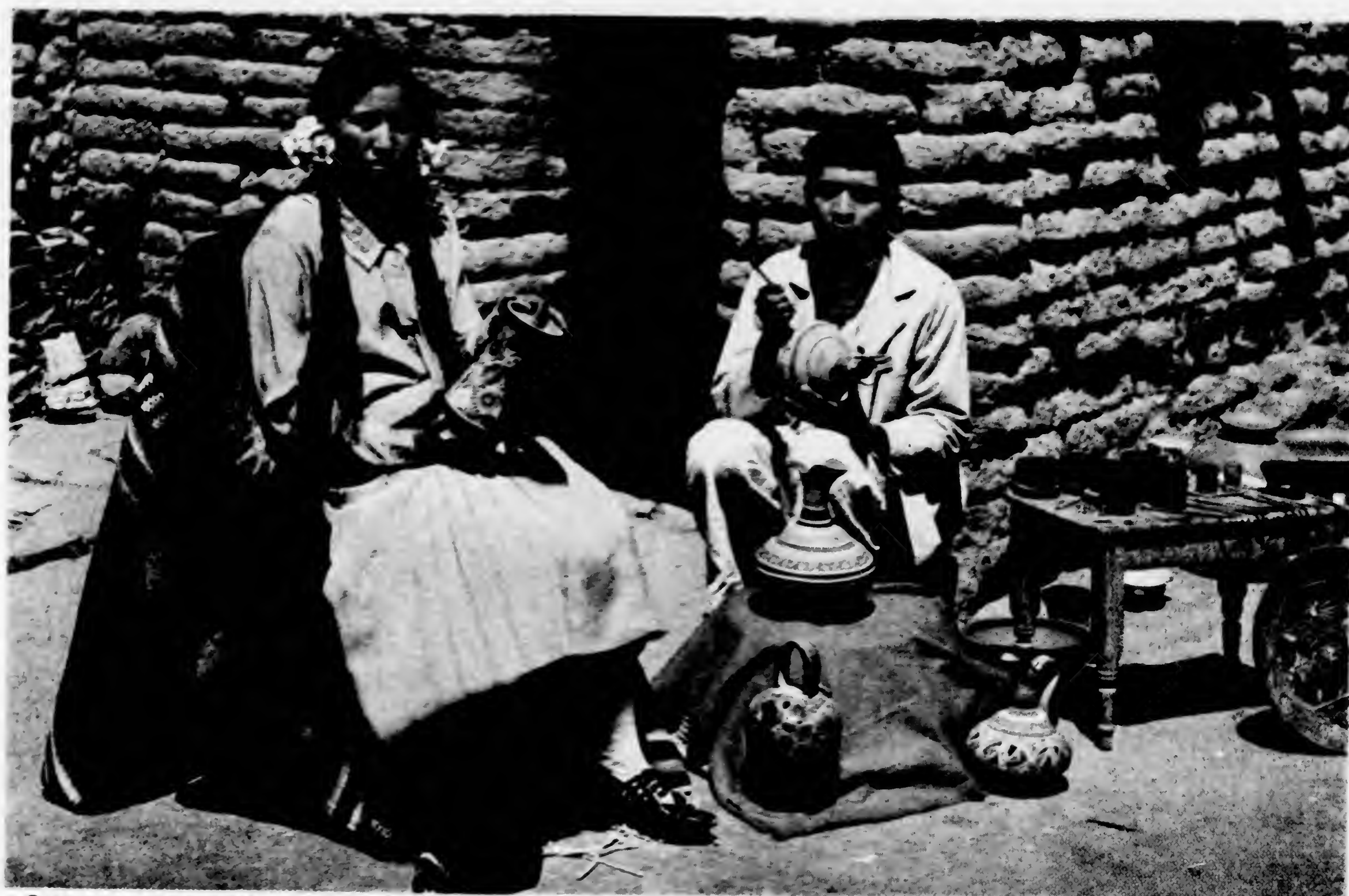


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Natural Color Photograph by L. Pérez Parra

THIS INTERESTING COMPANY WAS MADE OF CLAY

Prominent Mexican and foreign characters appear here. The Panduro family of Indian artists, working at San Pedro Tlaquepaque (see Color Plate VI), is famous for its skill in this caricature. At Señor Obregon's right is Uncle Sam. Henry Ford, carrying a cane, is at the far right of the picture.



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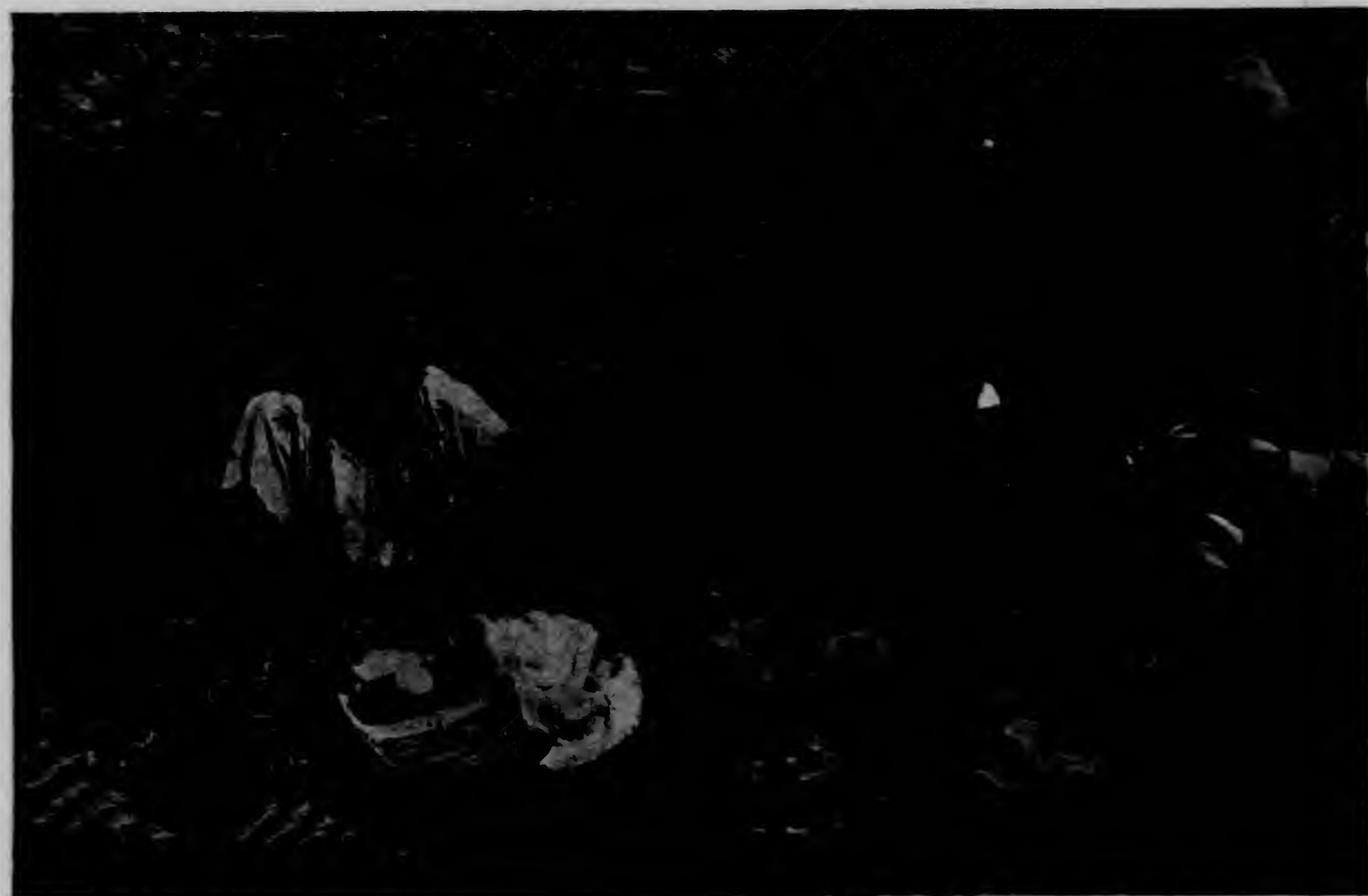
VII

Retake of Preceding Frame



GIRLS OF GUADALAJARA MAKING MATS FROM MAGUEY FIBER

More skilled workers prepare the fiber from maguey, often called "century plant." Demand is brisk, and mat-weaving flourishes. For centuries the maguey plant has figured locally in various industries.



© National Geographic Society

Natural Color Photographs by L. Pérez Parra

BREAD MADE FROM CORN IS THE COMMON FOOD OF MOST MEXICANS

This girl of the working class is baking tortillas. She first shucked the corn, then ground it fine on her flat stone and mixed it with water. The sound of women patting the tortilla, or corn cake, is the most familiar of all Mexican domestic sounds.

wealth and beauty of heirlooms from colonial days. Hand-made silverware, even table services of gold, heavy Spanish chests bound in leather and copper, miniatures, jewelry, crucifixes and old paintings, guitars inlaid with pearl, historic weapons, hand-carved tables, and other furniture so heavy that it can be moved only with difficulty.

On some bedroom walls may hang the painting of a large eye, representing the all-seeing eye of God, to keep minds pure and conduct correct. The old hand-made locks on front doors are often so massive that the key itself may be as big and heavy as a common hatchet, say a foot long.

GUADALAJARA SWIMS IN LAKE CHAPALA

By motorcar or bus, week-end pleasure-seekers quit the city for Lake Chapala, 23 miles south. Fed by the Rio Lerma, this 70-mile-long fresh-water lake is Mexico's largest. Ruins like bits of Pompeii fringe it, and among them Indians of to-day raise their crude shelters. Here are villas of the rich, too, and scenic lakeside hamlets where artists and poets, including Americans, like to loiter (see page 339).

"But look out for scorpions," warned my host. "They always crawl out on a rainy night. Shake out your clothes and shoes before you put them on in the morning."

Though Lake Chapala swarms with pleasure craft, fishing boats, and Indian canoes, its navigation is often impeded by floating hyacinths. Some well-intentioned person planted these wandering flowers in the lake; now they have become a nuisance. They clog up launch propellers and spoil the bathing. In vain men fight this pest, raking tons of it out on the beaches to be burned.

Indians, half nude, wade into the shallows, casting their nets for the tiny but delicious *charal* fish (see page 340). Many other kinds abound. From Canada and the States, too, in autumn, myriad geese, duck, snipe, and other waterfowl gather on Lake Chapala. The Indians say these birds "come to get cool," because they reach here in the Mexican winter.

Dry, gloomy Mezcala Island, once a military prison, holds the mystery of Chapala. Mexican writers believe that long ago it was an Aztec stronghold. Native patriots held it, through a siege by Spaniards, in the fight for Mexican independence. Away down at San Blas, on the Pacific, Spaniards

built portable gunboats and packed them up steep slopes to the lake for use against the island stronghold. Failing in this, royalists starved out the defenders by laying waste the adjacent lake shore and shutting off all food.

In the long ago, for some reason, many small Aztec idols were thrown into this lake, from whose shallows they are constantly being recovered and sold to tourists. Some of these "accidental" finds are suspiciously new.

Out from the lake flows the Rio Santiago, passing near Guadalajara, where famous Juanacatlán Falls furnish power and light for the city. "Mexico's Niagara," these beautiful falls are styled. In the narrow valley of the deep canyon below, 2,000 feet lower than the city, tropical fruits grow in abundance. Picnic parties go there to bathe and romp, and pigs dive like tapirs to feed on the roots of river plants.

Winding down through scenic *barrancas*, or canyons, the Rio Santiago reaches the Pacific at San Blas, of whose bells Longfellow wrote. From here, in old days, a paved Spanish road, now in ruins, ran across Mexico to Veracruz. Philippine galleons landed here, and mules carried rich cargoes overland, dodging bandits—for banditry is Mexico's original sin.

WHERE MANY BELLS OF CALIFORNIA MISSIONS WERE CAST

Such historic explorers as Portolá and Father Junípero Serra passed this way for California, and many of the old bells in California missions were cast at San Blas. Not far from here Cabeza de Vaca met the Spaniards, after his seven years of wandering across country.

Ride out any country trail and you meet big-hatted men driving herds of cattle to market. They carry cigarettes and matches tucked in the rolled rims of these huge hats. (Guadalajara's hat rims once got to be so wide that men wearing them in crowds hit others in the eye or nose, and police had to limit the diameter.)

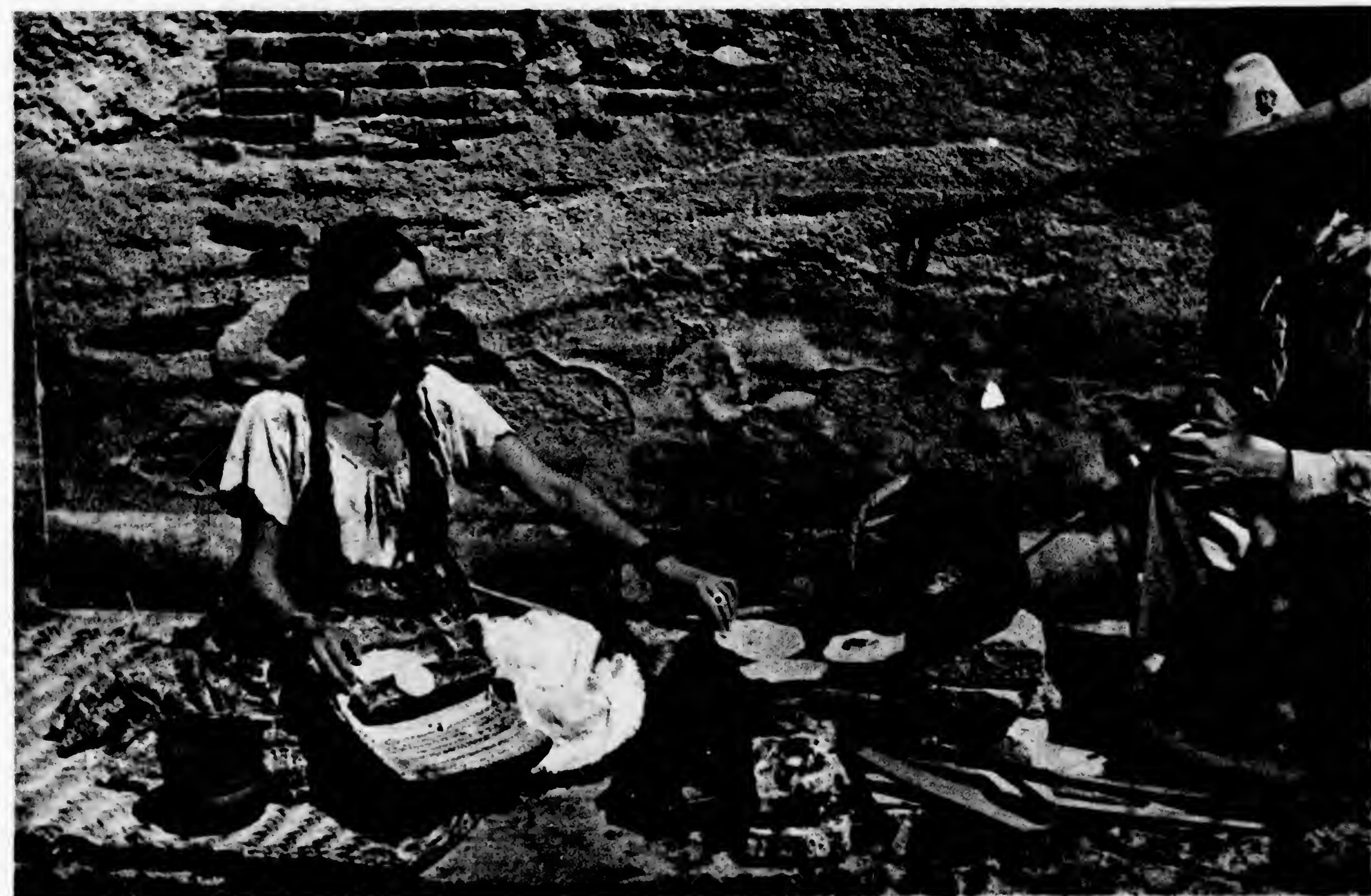
To the city also come long files of burros carrying live poultry, fruit, pottery, or firewood. Some burros are loaded so high with bulky fodder that they look like walking haystacks. Others drag long timbers, one on each side. Who called them the "short and simple animals of the poor"?

Fields of corn, vast as those in Kansas, dot this part of Mexico; yet in bad years



GIRLS OF GUADALAJARA MAKING MATS FROM MAGUEY FIBER

More skilled workers prepare the fiber from maguey, often called "century plant." Demand is brisk, and mat-weaving flourishes. For centuries the maguey plant has figured locally in various industries.



© National Geographic Society

Natural Color Photographs by L. Pérez Parra

BREAD MADE FROM CORN IS THE COMMON FOOD OF MOST MEXICANS

This girl of the working class is baking tortillas. She first shucked the corn, then ground it fine on her flat stone and mixed it with water. The sound of women patting the tortilla, or corn cake, is the most familiar of all Mexican domestic sounds.

VIII

wealth and beauty of heirlooms from colonial days. Hand-made silverware, even table services of gold, heavy Spanish chests bound in leather and copper, miniatures, jewelry, crucifixes and old paintings, guitars inlaid with pearl, historic weapons, hand-carved tables, and other furniture so heavy that it can be moved only with difficulty.

On some bedroom walls may hang the painting of a large eye, representing the all-seeing eye of God, to keep minds pure and conduct correct. The old hand-made locks on front doors are often so massive that the key itself may be as big and heavy as a common hatchet, say a foot long.

GUADALAJARA SWIMS IN LAKE CHAPALA

By motorcar or bus, week-end pleasure-seekers quit the city for Lake Chapala, 23 miles south. Fed by the Rio Lerma, this 70-mile-long fresh-water lake is Mexico's largest. Ruins like bits of Pompeii fringe it, and among them Indians of to-day raise their crude shelters. Here are villas of the rich, too, and scenic lakeside hamlets where artists and poets, including Americans, like to loiter (see page 339).

"But look out for scorpions," warned my host. "They always crawl out on a rainy night. Shake out your clothes and shoes before you put them on in the morning."

Though Lake Chapala swarms with pleasure craft, fishing boats, and Indian canoes, its navigation is often impeded by floating hyacinths. Some well-intentioned person planted these wandering flowers in the lake; now they have become a nuisance. They clog up launch propellers and spoil the bathing. In vain men fight this pest, raking tons of it out on the beaches to be burned.

Indians, half nude, wade into the shallows, casting their nets for the tiny but delicious *charal* fish (see page 340). Many other kinds abound. From Canada and the States, too, in autumn, myriad geese, duck, snipe, and other waterfowl gather on Lake Chapala. The Indians say these birds "come to get cool," because they reach here in the Mexican winter.

Dry, gloomy Mezcala Island, once a military prison, holds the mystery of Chapala. Mexican writers believe that long ago it was an Aztec stronghold. Native patriots held it, through a siege by Spaniards, in the fight for Mexican independence. Away down at San Blas, on the Pacific, Spaniards

built portable gunboats and packed them up steep slopes to the lake for use against the island stronghold. Failing in this, royalists starved out the defenders by laying waste the adjacent lake shore and shutting off all food.

In the long ago, for some reason, many small Aztec idols were thrown into this lake, from whose shallows they are constantly being recovered and sold to tourists. Some of these "accidental" finds are suspiciously new.

Out from the lake flows the Rio Santiago, passing near Guadalajara, where famous Juanacatlán Falls furnish power and light for the city. "Mexico's Niagara," these beautiful falls are styled. In the narrow valley of the deep canyon below, 2,000 feet lower than the city, tropical fruits grow in abundance. Picnic parties go there to bathe and romp, and pigs dive like tapirs to feed on the roots of river plants.

Winding down through scenic *barrancas*, or canyons, the Rio Santiago reaches the Pacific at San Blas, of whose bells Longfellow wrote. From here, in old days, a paved Spanish road, now in ruins, ran across Mexico to Veracruz. Philippine galleons landed here, and mules carried rich cargoes overland, dodging bandits—for banditry is Mexico's original sin.

WHERE MANY BELLS OF CALIFORNIA MISSIONS WERE CAST

Such historic explorers as Portolá and Father Junípero Serra passed this way for California, and many of the old bells in California missions were cast at San Blas. Not far from here Cabeza de Vaca met the Spaniards, after his seven years of wandering across country.

Ride out any country trail and you meet big-hatted men driving herds of cattle to market. They carry cigarettes and matches tucked in the rolled rims of these huge hats. (Guadalajara's hat rims once got to be so wide that men wearing them in crowds hit others in the eye or nose, and police had to limit the diameter.)

To the city also come long files of burros carrying live poultry, fruit, pottery, or firewood. Some burros are loaded so high with bulky fodder that they look like walking haystacks. Others drag long timbers, one on each side. Who called them the "short and simple animals of the poor"?

Fields of corn, vast as those in Kansas, dot this part of Mexico; yet in bad years

Retake of Preceding Frame



Photograph by Rautt

JALISCO PEONS FILL BIG-MOUTHED BASKETS WITH RIPE CORN

United States farmers straddle one corn row with a wagon and "jerk" five rows at a time. Here no wagon is used, and for his work the peon receives a small share of each basketful brought in.

corn must be imported from the United States, since it is the people's chief item of food.

FEUDAL ESTATES AND SMALL FARMS

Fortlike ranch houses, with adobe walls, corrals, servants' quarters, outbuildings, blacksmith shops, self-contained units on a feudal scale, are aspects of Jalisco. These are the haciendas. As in Sinaloa and Puebla, some have been in the same families for generations.

In contrast, a few miles below Guadalajara you come upon one of Mexico's agrarian experiments, where a large tract of once privately owned land has been cut into model small farms.

In one cornfield, so large we couldn't see the end of it, men were walking through, picking the ripe ears and carrying them in hampers lashed on their backs. To help balance the load, each peon had a strap tied around the heavy basket and across his forehead.

Peon women grind corn meal, using a flat slab of rock on which they lay the corn and then roll or mash it with another smooth stone. From this meal they make

tamales and the dough for tortillas, and that peppery corn cake, covered with grated cheese, onions, and hot sauce, called the *enchilada*.

Mexico's most familiar sound is that made by peon women patting tortillas from corn-meal dough, flattening it into a cake for baking (see Color Plate VIII). In many places, however, this corn dough, or *masa*, is made by machinery and sold ready-mixed; and even ready-baked tortillas can be bought.

Their other steady job is washing. "They have two dresses," the saying is, "one to wear while they wash the other." Washerwomen beside a stream were slapping wet clothes on the rocks to clean them. On serapes, in the shade, lay their babies. This serape is a blanket with a long slit in it. Put your head through the slit and the serape falls about you like a cape. I have seen soldiers on the march use the serape in turn as saddle, coat, and covering at night. City peons sometimes pawn their serapes in the morning and then buy them back at night, when they get their daily wage. Red and gray, many serape patterns show a sunset or an Aztec god.



Photograph by L. Pérez Parra

PACK ANIMALS PLOD OVER HILLSIDE TRAILS HEWN CENTURIES AGO

These burros are loaded with "barrel" cactus, from which a "cactus candy" is made by boiling in sugar, much as preserves are made in the United States from watermelon rind.

Crosses raised beside piles of loose rock mark the wayside graves of those who die by violence—so many do—and reverent peons, walking by, stop and say a prayer and add another stone to the pile. But the peon is not always so reverent. Once a troop train pulled into a Sonora station with a dead man sitting grotesquely on the engine's cowcatcher, tied there as a grim joke by the soldiers who had shot him.

Saturday sees a constant stream of peasants city-bound. Some walk, some ride burros. Those who have the cash take the bouncing busses, piled high also with home-made wares for markets, such as sandals, straw hats, *petates*, or reed mats, bridles and riatas, and hatbands of woven horsehair. This *petate* is a thing of universal possession and the Indian's basis of wealth. Though cheap and common, it is Mexico's oldest household object. Aztecs used it, made exactly as now. It is at once a thing to sit on, sleep on, be born on, and die on. Woven from the fragrant tule reed, it is yellowish in color when new and clean, and feels smooth and cool to bare feet on hot days.

"Whoever was born on a *petate* carries

its smell to his grave," says a proverb. It figures in many other homely sayings. When peons move they wrap up their few goods in it. Small boys roll it into the shape of a bull's head and slip it on to play at bullfighting. The last guest to leave is "the man who stays to pick up the *petate*," says Anita Brenner in her book, "Idols Behind Altars." Much ado about nothing is "a shake of the *petate*," and bad times are when "there isn't a *petate* to fall dead on."

On her *petate*, in the shadow of the exclusive Casino, an Indian woman may nurse her brown baby without even a glance at the bankers and traders in linen suits and Panama hats strolling there for noonday cognac and gossip.

One night I stood before the huge theater watching the crowd enter, with beautiful women in evening wraps and silver slippers. Wrapped ear-high in serapes came a silent group of peons, or "sandal foots," walking out in the street, not on the sidewalk. Quietly they slipped by the gay, chattering throng, seemingly oblivious of it.

Wide now as ever is the gulf between the stolid, inscrutable Indian peon on one side



Photograph by Rautt

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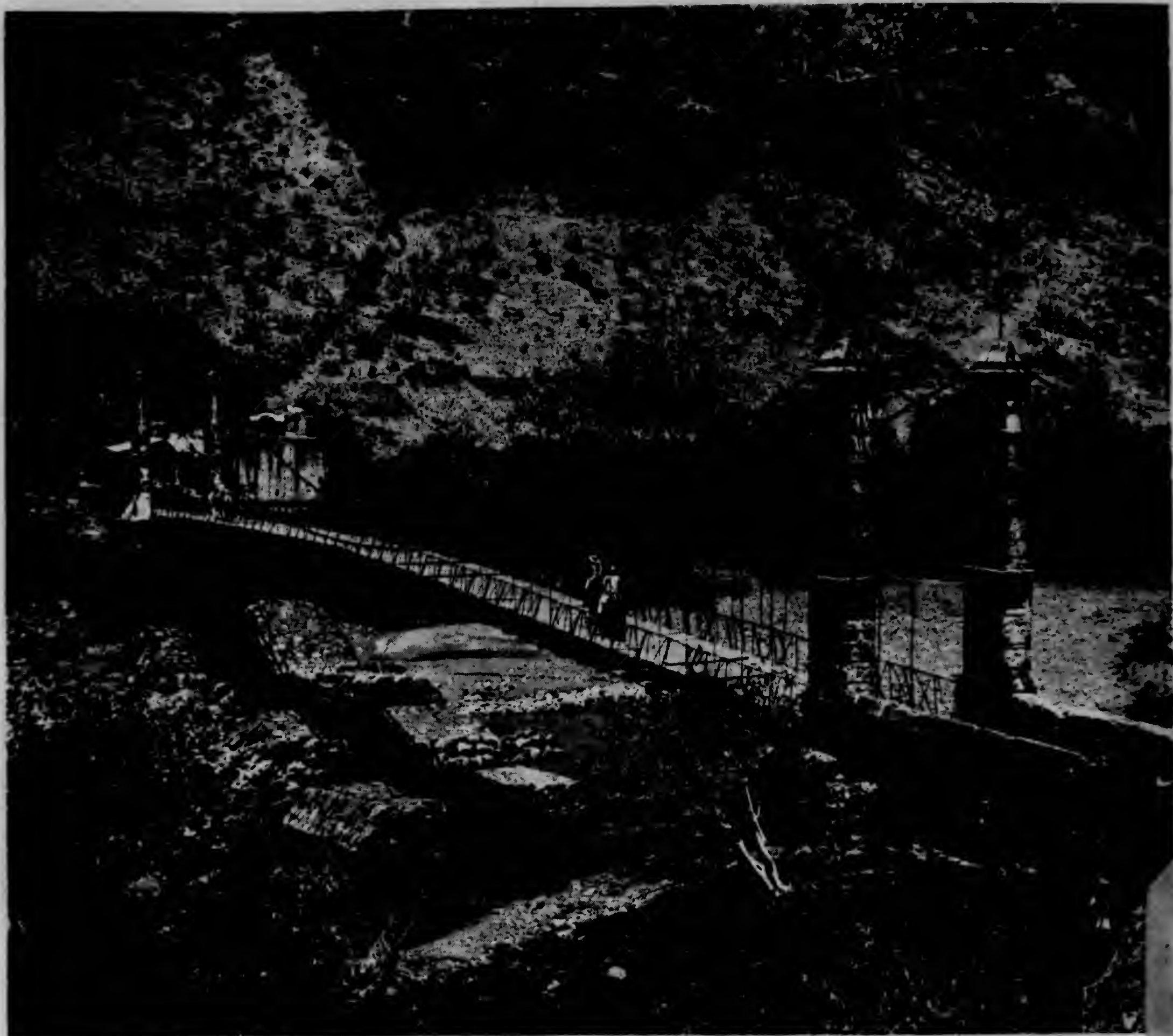
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Retake of Preceding Frame



Photograph by L. Pérez Parra

LIKE THE MYTHICAL BRIDGE OF SAN LUIS REY, TRAGEDY AND DEATH HAVE
HAUNTED THIS STRUCTURE

Before any bridge spanned the Santiago here, baskets on cables carried people across the river. Sometimes passengers were left suspended in mid-air. Rebels partially burned the bridge in 1928, paralyzing traffic. Porters carrying accumulated freight across the charred skeleton fell into the river and perished. During floods the Santiago rises to the bridge's floor.

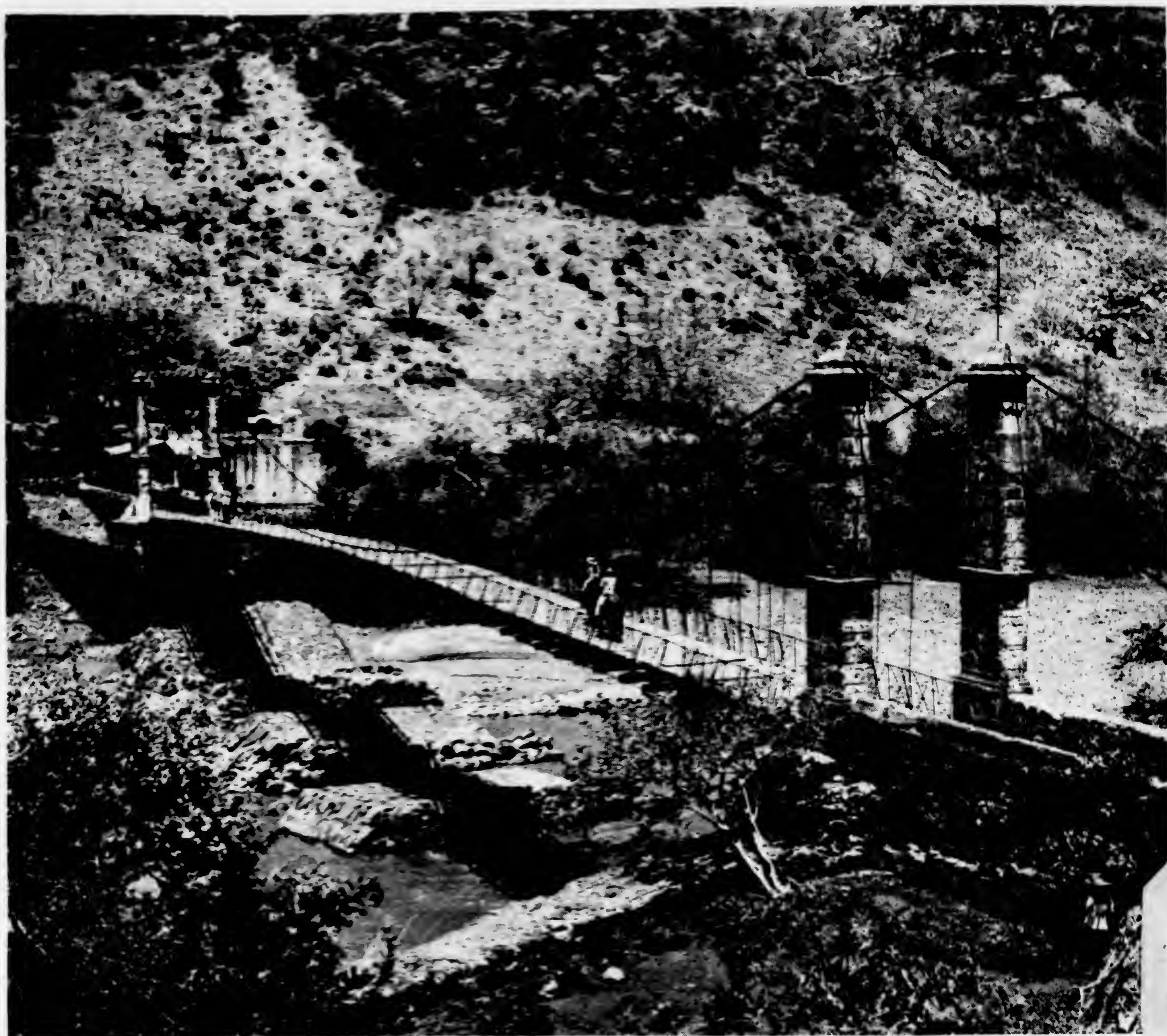
and the Spaniards and town-dwelling *mes-tizos* on the other.

Social cleavage is distinct among all national groups. Americans have their own little club. They work and play together, mingling mostly with each other and the British.

Americans built a railroad down the west coast and up the famous *barrancas*, or almost insuperable ravines, from Nogales, on the Arizona border; now Southern Pacific sleepers may run from Los Angeles through to Guadalajara. Rails also link the city with the sea at Manzanillo; still another system ties it with Mexico City, with the Gulf of Mexico, and the Texas border. These railways, with the Nation's steadily growing net of motor highways,

make Guadalajara an active distribution center. Here cheap electric power, ample labor, and abundant raw materials stimulated various industries. These include spinning and knitting mills, candy and cracker works, and shops famous for their beautiful tiles and mosaics.

A mile above the sea, fragrant with orange blossoms and swept by cool, tonic breezes, Guadalajara might well be a prize tourist town of Mexico. But it isn't. Aloof and conservative, it goes its aristocratic way, stiff and formal. Not even a baby skyscraper yet dares lift its head above old churches, convents, and parrot-haunted patios. Architecturally and culturally, here is loyalty to cherished Spanish patterns of long ago.



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Retake of Preceding Frame

Mexico - Aztec

1927-33

AZTEC "JADE"

THE mystery of the source of the jade-like stone used by the Mayas and ancient Mexicans for making images and ornaments has been solved by the discovery of a mass of the rock at Zimapan in the State of Hidalgo. The discoverers are Professor Ramon Mena, chief of the department of archeology of the Mexican National Museum, and engineer De La Cerda.

The abundance of objects carved out of this stone, and the absence of any known deposits of jade in Mexico, was long taken as evidence of an Asiatic origin of the Indian tribes of that region, and of a long-continued trans-Pacific traffic. However, it has been known for some years that the stone is not a true oriental jade, but a mineral known technically as nephrite, belonging to the class of stones known as jadeite, resembling jade but not identical with it. The parent mass of this jadeite was not known, and the only unworked pieces so far brought in have been rounded pebbles found in water-courses. It was as a result of a search for the source of these pebbles that the two Mexican scientists came upon the jadeite deposit.

Jade and jadeite have been held in high veneration by many widely scattered primitive races. The earliest jade used was in the form of water-smoothed pebbles and these were rough and lacked the polish that made later jade ornaments so beautiful. The beauty of jade and similar stones was probably discovered with the coming of the New Stone Age, it is said, when polishing was applied generally to stone implements and ornaments used. Its toughness, its ability to take a very high polish and keep it, the beautiful coloring, and its peculiar "feel" when polished, probably gave it the popularity it has held for thousands of years among many races.

Although jadeite has hitherto never been found in place in Mexico many archeologists suspected that some day it would turn up, because many worked objects found in sepulchers or among other prehistoric remains showed that they were originally river pebbles. This is obvious from the shape as well as from portions of the rough surface that remains. In the Mexican National Museum there is a large collection of jadeite bead necklaces obviously made from river pebbles.

The collection of ornaments, statuettes, earrings, pendants, plaques, breast ornaments, collars, amulets and other objects in the Museum of Mexico City is one of the most remarkable in the world. Recently a beautiful vase, a foot high, carved in the front to represent the Aztec flower god Tlaloc, from Tlauchititla in the State of Mexico, was added to the collection.

126. ANCIENT CHICHIMECA LITERATURE

JOHN HUBERT CORNYN, MIXCOAC, D. F., MEXICO

In 1629 a Mexican priest, Ruiz de Alarcón, published in Aztec a collection of rituals and ceremonial incantations, written "in the trochaic meter which grew out of the peculiarly trochaic structure" of the Aztecan. The collection is essentially the only remains we possess of an ancient mythology and cult surviving into Aztecan times; many deities cluster about the Fire God as the center of the religion; the personae of this mythology, described in detail, were the dearly beloved gods of the masses of the people in contradistinction to the later deities of the Aztec temple. The overthrow of the Aztecs failed to affect the literature and ritual of the ancient faith of the people; none of this plebeian cult was preserved by Sahagún. The Chichimecas were still nomad hunters in post-Columbian days; all their recorded literature is in metric form; it contains formulas, ceremonies, incantations for every eventuality; different classes of persons had their several rituals for their several occupations. The richness and picturesqueness of the imagery and metaphor of the rituals is shown in two examples of the literature presented and analyzed: the ceremony for the hunt, and the incantation to drive away insomnia.

The Aztec language is innately trochaic, adapting itself easily, almost mechanically to a poetic style consisting of trochees. Over ninety per cent of Aztec literature is in trochaic form; all the Chichimeca literature is trochaic. There are appended examples of scansion of lines taken from the literature.

116. AZTEC LINGUISTICS

BENJAMIN L. WHORF

Linguistically, Aztec is an outstanding example of a type designated as *oligosynthetic*, meaning built up from a few elements. Stems as well as words are synthetic formations. Ultimate roots number only about fifty, and are monosyllables each conveying a general notion capable of wide modulation without loss of the basic sense. Combinations of these cardinal ideas are at the basis of nearly all meanings. Lists and examples are given.

Oligosyntheses suggests possibilities of a hitherto unsuspected kind of ideographic writing, and while it is unlikely that the Aztecs employed such, the possibility should be remembered when dealing with Maya, which may be oligosynthetic after a different patterning from Aztec.

tern. These showed most interesting plant types of the high mountains near Li Chiang at an elevation of 10,000 to 17,000 feet. Especially striking was a new *Primula*, first discovered a few years ago, with a spiked inflorescence which more resembles an orchid than a *Primula*. It has been named *P. Littoniana*. The buds are of a dark purple, while the open flowers are colored. A very peculiar plant of biological interest is a new *Saussurea*, which inhabits limestone boulders at about 17,000 feet and has the flowers hidden among the leaves, which are densely hairy and protect them from snow and frost. The virgin forest of the Li Chiang zone consists of *Pinus Massoniana*, various *Piceas*, *Abies Delavaya*, *Tsuga Yunnanensis*, evergreen oaks, many *Rhododendrons* and numerous other shrubs and herbs. The cryptogamic flora is also very rich. Dr. Schneider has collected over 3,000 different species of phanerogams and ferns.

The Genus Endothia: DR. N. E. STEVENS.

To be published in full elsewhere.

Endothia Pigments: DR. LON A. HAWKINS.

To be published in full elsewhere.

Identification of the Teonanacatl, or "Sacred Mushroom" of the Aztecs, with the Narcotic Cactus, Lophophora Williamsii, and an Account of its Ceremonial Use in Ancient and Modern Times: MR. W. E. SAFFORD.

The early Spanish writers describe certain feasts of the Aztecs in which a narcotic called by them *teonanacatl*, or "sacred mushroom" was used as an intoxicant. Bernardino Sahagun, writing before 1569, states that it was the Chichimeca Indians of the north who first discovered the properties and made use of these "evil mushrooms which intoxicate like wine." Hernandez distinguishes them from other mushrooms (*nanacame*, plural of *nanacatl*) which are used as food, by the distinguishing adjective *teyhuinti*, inebriating, "quoniam inebrare solent." The belief survives that the drug thus used was a mushroom; according to Rémi Siméon, the *teonanacatl* is "une espèce de petit champignon qui a mauvais gout, enivre et cause des hallucinations."¹ Investigations of the author have proved that the drug in question is not a fungus but a small fleshy spineless cactus endemic on both sides of the Rio Grande in the vicinity of Laredo, Texas, and in the state of Coahuila, ranging southward to the states of Zacatecas, San Luis Potosi, and Querétaro, a region inhabited in ancient times by the tribes

¹ "Dict. de la langue Nahuatl," p. 436, 1885.

called Chichimecas. The drug is prepared in two principal forms: (1) discoid, in which the head of the plant is cut off transversely, and when dried bears a close resemblance to a mushroom; (2) in longitudinal pieces or irregular fragments, in which the entire plant, including the tap root, is sliced longitudinally into strips, like a radish or parsnip, bearing no resemblance whatever to a mushroom, and designated by early writers as *peyotl*, and also as *raiz diabolica*, or "devil's root."

The first to call attention to the ceremonial or religious use of this drug by the Indians of today was Mr. James Mooney, of the Bureau of American Ethnology, in a paper read before the Anthropological Society of Washington, November 3, 1891. Since the time of Mr. Mooney's observations the use of the drug has spread widely among the Indians of the United States, by whom it is commonly called "mescal button" or "peyote."

Efforts have been made to prevent the Indians from using it, chiefly because it is believed by some of those interested in the Christianizing of the Indians that it has a tendency to make them revert to their primitive condition and to their heathen beliefs. Action was taken in the courts to prosecute a certain Indian for furnishing this drug to the Indians of the Menominee Reservation of Wisconsin on March 15, 1914. It developed that the drug was received by parcel post from the vicinity of Laredo, Texas. In a paper before the Lake Mohonk Conference in October, 1914, affidavits of certain Indians of the Omaha and Winnebago tribes of the Nebraska reservation were read. The evidence showed that there is a religious organization among the Indians called the "Sacred Peyote Society," the ceremonial meetings of which are remarkably like those of the ancient Mexicans in which the "sacred mushroom" was eaten; and the physiological effects, as described by those partaking of the drug, were identical with those attributed by the early writers to the *teonanacatl*. The chemical properties of the drug have been studied in Germany and the United States, especially by Lewin, of Berlin, Heffter, of Leipsic, and the late Ervin E. Ewell, of the Bureau of Chemistry, U. S. Department of Agriculture; and the physiological effects by Drs. D. W. Prentiss and Francis P. Morgan, of Washington, D. C.; but it is not possible to give the detailed results of these investigations in the scope of the present paper.

As far as the author knows, this is the first

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time the identity of the "sacred mushroom" or "flesh of the gods" with the narcotic cactus known botanically as *Lophophora Williamsii* has been pointed out. That the drug was mistaken for a mushroom by the Aztecs and early Spaniards is not surprising when one bears in mind that the potato (*Solanum tuberosum*) on its introduction into Europe was popularly regarded as a kind of truffle, a fact which is recorded by its German name *Kartoffel*, or *Tartuffel*.

PERLEY SPAULDING,
Corresponding Secretary

SCIENCE NEWS--DEC. 1928

77. ULTIMAS EXCAVACIONES EN LA PIRAMIDE
DE TENAYUCA

JOSE REYGADAS VERTIZ

A discussion of the stages of excavations by means of which were discovered a building of Aztec construction with a wall on the lower part of the northeastern and southern sides formed by the bodies of about 100 serpents.

This is followed by a study from an architectural point of view of the epochs of construction which appear in the building. The paper is accompanied by a plan and photographs taken during the course of excavation.

SCIENCE NEWS--DEC. 1928

109. TOLTEC HISTORY

BENJAMIN L. WHORF

The author's study of the Aztec language has a twofold purpose; first, the reading of untranslated manuscripts dealing with ancient Mexico; second, the study of a phenomenon which he calls *oligosynthesis*, significant for general linguistics and psychology.

He presents the first translation of a page of manuscript of a Toltec history from a Harvard photostat of one page of a document in Paris.

DISCUSSION AND CORRESPONDENCE

THE AZTEC CALENDAR STONE

The so-called "Calendar Stone" of the Aztecs is a puzzle. Is it an original native conception or is it borrowed?

Bandelier, in his Archaeological Tour in Mexico, after a discussion of its possible significance and use, concludes that it was a sacrificial stone and calls it "The Stone of the Sun." He condemns the name "Calendar Stone" which he holds was due to an error of Antonio de Leon de Gama.

With Bandelier I disagree entirely. There is no evidence that it was a sacrificial stone, and there is abundant evidence in the carving on the stone that either it was used in Aztec astronomical operations or was a borrowed pattern set up as a ceremonial stone.

The reason for this statement lies in the fact that the design on the stone is an exact reproduction of a compass card; or, as it was early called, a "Rose of the Winds." In 1901 I mentioned this in my volume *The North Americans of Yesterday*.¹

On the face of the stone are carved the thirty-two "points of the wind" of the mariner's compass-card of the fifteenth century. The Aztec date is the 13th Acatl which translated into our chronology is A.D. 1479, thirteen years before Columbus landed.

My description in the volume referred to was this: "In the centre is a head supposed to represent the sun, and around it are twenty figures, standing [as alleged] for the twenty days of the Mexican month. Then come eight divisions by what appear to be arrow heads, four being extended farther toward the centre than the others and also curled up at the ends, or flukes, and one of these four ending in an elaborate sort of bowknot ornament which covers a wide space at what is now the lower edge as it stands. Each of the eight divisions is again divided by a kind of crown which is smaller than the smaller arrowheads, and then there is a still further subdivision made by a dot on a line with the base of the crown. This gives thirty-two points, exactly the number of points on our mariner's compass-card, so that this carving can be 'boxed' as any compass card can be."

The stone also has the five concentric circles of an ordinary compass-card. These circles have not been changed since the fifteenth century; nor have the other features of the card.

The design is surely the same as a fifteenth century compass-card and, according to the Aztec date, the stone was carved in the fifteenth century.

The puzzle seems to be: how did the Aztecs get this design? And did they know its significance and use it in astronomical work? Furthermore how long was the design known to the Aztec before this stone was carved?

Thirty years ago I concluded that it was an independent development, but I am now convinced that it was not, for the additional "wind points" on our compass

¹ Frederick S. Dellenbaugh, *The North Americans of Yesterday*, p. 182. Putnams, New York, 1901.

card, beyond the cardinal points, were only added after navigators began to sail out of sight of land. The Aztecs never were on the sea at all, therefore they had no need of the extra wind points, and would not themselves have added them, even if they had been using a compass card. But so far as known they had no compass. Was this stone then only used for directions? And why all the wind-points in astronomical work? These wind-points were only necessary in steering a vessel at sea.

There is still another puzzling item in the design on the stone. At the bottom as it stands now, with the top apparently the north of the design, the south pole of the card is the one ornamented instead of the north as with European cards of the fifteenth century and also now.

The Chinese always ornamented the south pole. This would seem to suggest that the card forming the basis of this design was obtained from a Chinese source. Of course it is quite possible that it was obtained from some Chinese vessel blown out of her course and finally wrecked on the coast of Mexico. It is strange in that case that the compass itself was not preserved or some representation of it.

Professor Wiener doubtless would claim that this design came from the Arabs, through Africa to Mexico, but if it came from the outside world at all (and it seems that it must have come from the outside) the most likely source was from some Chinese, or other Oriental ship, touching the coast of Mexico, or wrecked there. The ornamentation of the south pole indicates Oriental rather than European origin, inasmuch as the Chinese considered the south pole more important in their navigation and consequently ornamented that point on the compass card.

As far as the decoration in Chinese fashion of the south pole of the card is concerned, however, there is left still another assumption, namely: that since the compass was derived by Europe from the Chinese, possibly the decoration of the south pole may have continued for a long time in Europe as a mere inherited decoration.

But the Chinese were never great navigators, and their compass seems to have been rather crude, so it is doubtful if this elaborate design of the Aztecs could have been patterned on a Chinese card.

That it is an elaborately decorated "Rose of the Winds" of the Fifteenth Century seems certain. How did it get to Mexico?

FREDERICK S. DELLENBAUGH

~~RECENT ANTHROPOLOGIC REPORTS OF THE GOVERNMENT OF PAPUA~~

~~The anthropologic papers published by the Government of Papua, under the capable editorship of Mr. F. E. Williams, Government Anthropologist, have become an indispensable part of every anthropologic library. The latest of the Reports (Nos. 9, 12, 13, 14) will take at once a preeminent place both in anthropology and colonial administration. Mr. Williams publishes his suggestions toward a better, more humane, and more efficient government of the Territory of Papua. Since he is a government official, his suggestions are not merely printed matter, and the fact that Sir Hubert Murray K.C.M.G., Lieutenant-Governor of Papua, in the great majority of cases shares Mr. Williams' views, lifts these reports from the theoretical level to that of achievements, future or past.~~

~~In his report on "Native Education; The language of Instruction and Intellec-~~

ARCHAEOLOGY

Ancient Aztec Capital Being Dug Out Beneath Mexico City

Excavations Rushed During Disagreeable Rainy Season Reveal Striking Ruins of Pre-Cortes Aztec Glory

THE IMPORTANT excavations unexpectedly begun by Mexican government archaeologists at the site of the great Aztec *teocalli*, or god-house, adjoining Mexico City's national cathedral have already yielded ancient remains. Human bones, remnants of plaster walls and floors, pre-Spanish pottery, were among the first discoveries.

The excavations are directed by Emilio Cuevas. Eduardo Noguera, chief of the department of archaeology at the Mexican National Museum, is making stratigraphic explorations.

The site, judging from old maps, was the heart of the Aztec city of Tenochtitlan. Here stood the greatest Aztec temples. So important are the possibilities which may lie beneath the ground here that the archaeologists are excavating in spite of the handicaps of the rainy season. Their chance to dig here is unexpected and must be seized. Modern building plans have just removed the old tumble-down shops and houses which for four centuries stood in the way of explorations at the site.

Twenty years ago, when another old colonial building was razed on the opposite corner, Dr. Manuel Gamio found such important Aztec ruins that the "ugly hole in the ground," as unsympathetic real estate dealers call it, has been left open. Street car riders passing the corner can see some of the big stone serpent's heads that once formed a sort of fence around the great Aztec public square. A corner of the foundations of the war-god's temple is seen in the hole, and sculptured figures of Aztec priests and warriors have been placed in the tiny local museum. These lined the stairs of the ruined pyramid, long hidden under the cellar floors of colonial homes.

Little is known of Aztec history, except from tangled Indian legends. Sr. Noguera's stratigraphic excavations at the downtown corner may reveal whether or not other civilizations prior to the Aztec occupied the island city.

The wall of a small white "temple"

has proved a puzzling find. To locate the bottom of the ancient structure, excavations have been pushed 20 feet below street level. In spite of the depth, no potsherds of any native culture except Aztec have so far been found.

Three floors, which were probably former street levels of the Indian city, have been superposed at different heights. The two upper ones were laid with large stone slabs, but the third, and lowest, is of concrete. Water-level has been reached, for the area was originally part of a swampy island in a lake. As there are few fires in the modern stone-built Mexico City, the municipal firemen, with little to do, pump water out of the excavations while archaeologists work.

The stone "temple" goes down much deeper than was supposed. It is massive in structure, but with its sloping wall and cornices it is not plain. Although the top cornice is like those on certain Maya buildings in Yucatan, so few samples of Aztec architecture survived Span-

ish destruction that it cannot be said that it is not Aztec. In fact the structure may help to determine just what "Aztec" architecture is.

Some of the archaeologists in Mexico City do not think that the structure is really a temple, but believe it more likely a solid platform, perhaps that on which the ritual of the gladiatorial sacrifice took place. The circular stage for combat faced the great pyramid on which the temple of the war god stood. The victim was tied to a pillar in its center by one leg, and allowed to fight for his life against four untrammelled warriors. If he won in the uneven battle he did not need to be sacrificed.

Discovery of a stone stairway beginning on the left end of the "temple," however, has strengthened the theory that the structure is part of the great temple. If the little "temple" was really the end of a wide stone balustrade of a former stairway, then the stairway and the pyramid it ascended must have been gigantic. How wide the stair actually was cannot be seen, for it goes under the street.

The ruins of the Aztec city dug up from beneath the sub-soil of the present Mexican capital are not the same ones that Cortes saw.

The native city had temples, pyramids and streets which had been many times rebuilt, new constructions being made on top of old ones. As the original Aztec city was on a swampy island in a lake, the Indian buildings sank

CHEMISTRY

Valuable Chemical To Be Extracted From Seawater

BROMINE, a chemical valuable in warfare and industry, can now be extracted cheaply from seawater, although only one pound exist in 2,000 gallons of water.

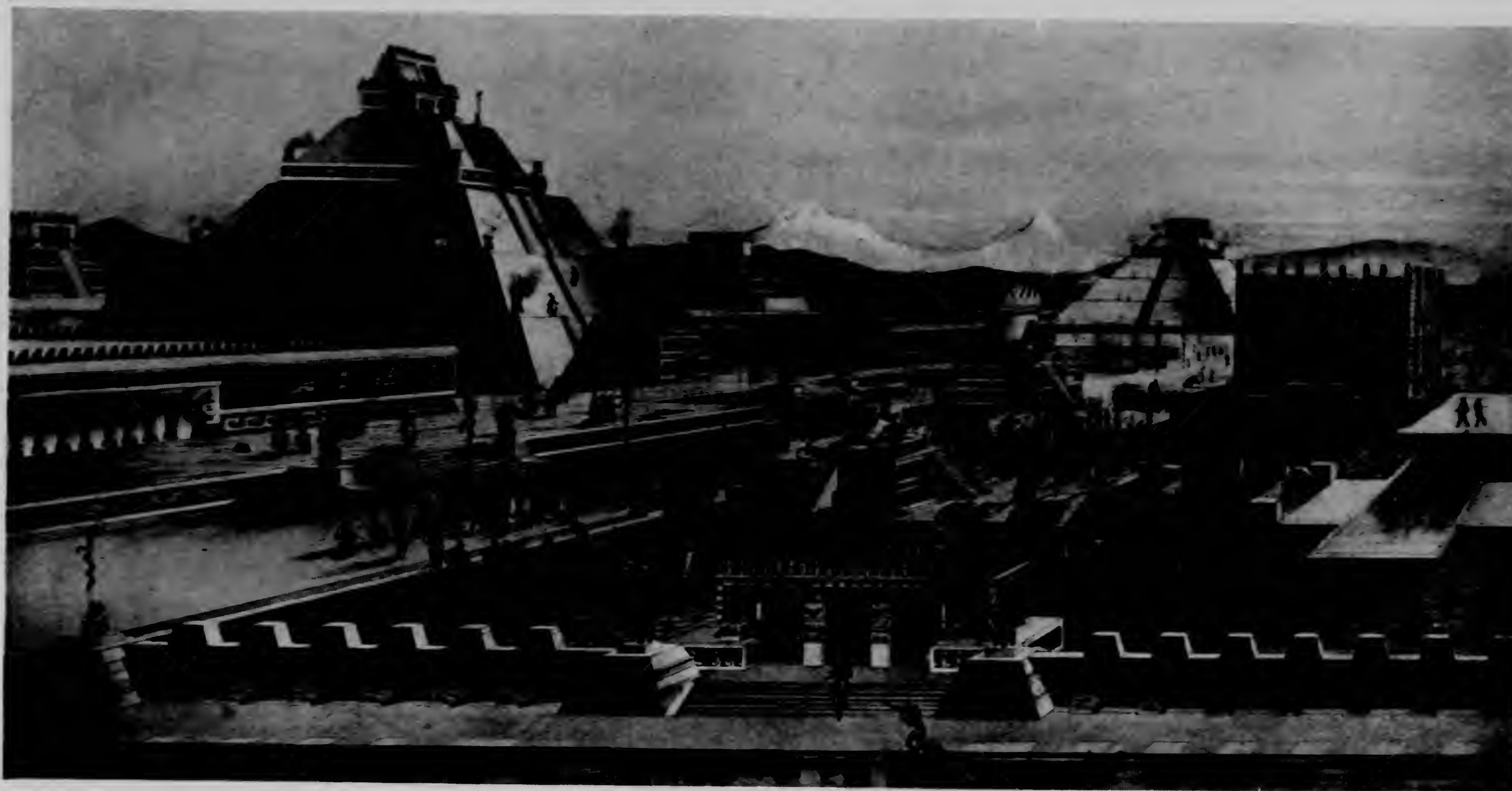
A large commercial extraction plant is being built at Kure Beach, N. C., by the Ethyl-Dow Chemical Co. to take advantage of a commercially practicable scheme recently developed by the Dow Chemical Company. Each unit of the new plant will produce 250,000 pounds of bromides each month by treating 13,000 gallons of seawater every minute of a 24-hour day.

The water passes through the ex-

tractor in less than a minute. It is treated with a small amount of a cheaper chemical, chlorine, to free the bromine in the water. Compressed air then blows the free bromine out of the water and sends it over a soda solution to concentrate the bromide.

A world shortage of bromine is now impossible because a cubic mile of seawater contains about 600,000,000 pounds of bromine. This chemical, which is the only liquid non-metallic element, is particularly useful in photography, medicine, and in the manufacture of tear gases and anti-knock gasoline.

Science News Letter, August 26, 1933



AS IT LOOKED IN AZTEC DAYS

A rare chance to dig in this sacred area of the Aztec capital is being seized by Mexican government archaeologists. In this temple enclosure you see at the left the lofty temple to the war god Huitzilopochtli, with the famous Aztec calendar stone vertical against the platform at the pyramid base. It is here, in a patch of ground once a part of the great temple's foundation, or close to it, that the present excavations are being made. Two other lofty temples are shown, and a round temple to Quetzalcoatl, god of the wind. In front of the round temple is a circular stone on which sacrificial combats were staged. At the extreme right is a skull rack—one of the seven in the temple enclosure. A corner of Montezuma's palace a low, rambling structure, is shown in the center, surrounded by the temples. This reconstruction, which shows only a portion of the extensive temple enclosure, was made by Ignacio Marquina, chief of the Direction of Prehispanic Monuments, at Mexico City.

(as modern Mexican ones still do) so that floor levels had undoubtedly to be raised from time to time.

The Spaniards came along, levelling the city with its buildings, leaving older inner portions of Indian structures exposed to view. The mysterious little white temple discovered in the cathedral lot is believed by archaeologists to be some such anterior structure.

Water-level has been reached in the perforations Mexican archaeologists are making, but man-made remains continue. Pumps are working and excavations will continue until virgin soil is reached in order to reveal the antecedents of the Aztec capital.

The street that now runs west across the back of the present cathedral was the Aztec causeway along which Cortes escaped out of the island-city one "Sad Night" in 1519 before the Conquest. It was also that street down which the great twin temples of Huitzilopochtli and Tezcatlipoca looked from the top of their high pyramid which was erected at right angles to it.

It has been proved lately that Indian

temples and pyramids were built to look straight into the setting sun on the Indian New Year's day, which was July 26, the day the sun goes back from its wanderings in the northern hemisphere into the southern. In order to face in that way, the buildings had to be set a little north of true astronomical east and west, the angle varying with the latitude. The east-west streets of modern Mexico City, which follow the former Aztec causeways, are similarly askew.

In order to test out the hypothesis that the Aztec capital was itself oriented in accordance with the Indian New Year's day, and the modern Mexican capital also as a result, measurements are being made on the ruins of an Aztec pyramid unearthed fifteen years ago by Dr. Manuel Gamio, just across the street from the present excavations in the cathedral lot.

Mexican archaeologists are also studying maps of Mexico City from earliest colonial times to modern ones in order to locate the limits of the Aztec city within the modern one that covers it.

Science News Letter, August 26, 1933

GEOLOGY

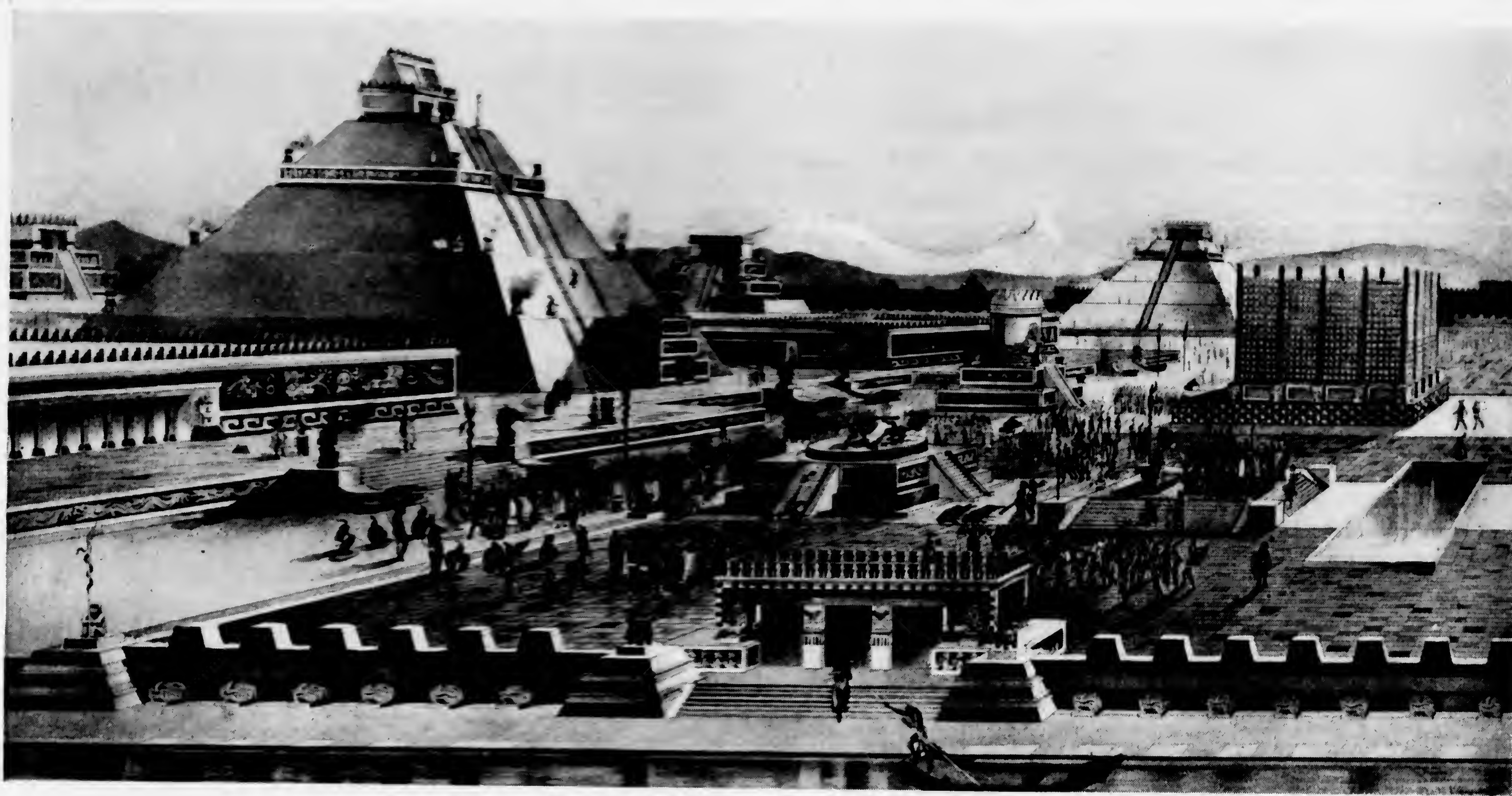
Free of Ice, Northern Lands Appear to Be Tilting

NORTHERN lands that bore the vast ice load of the Glacial Age for a million years now appear to be slowly rising, as one end of a raft rises in the water when weight has been removed.

This is the interpretation of apparent changes in land levels in the northern United States, Canada, and the Baltic regions of Europe, by Dr. B. Gutenberg of the California Institute of Technology. Dr. Gutenberg's study, appears in the *Journal of Geology*.

The tiltings examined by the California scientist are very slight, as measured by the year—only about two-fifths of an inch annually between Chicago and the northeastern part of the Great Lakes region. But if they have been going on for the past hundred thousand years or so they would amount to a good deal in the aggregate.

Dr. Gutenberg's suggestion is based



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Retake of Preceding Frame

18. THE AZTEC CALENDAR STONE AND ITS
SIGNIFICANCE

ERWIN P. DIESELDORFF

The author offers a new interpretation of the carvings on the famous Aztec Calendar Stone, based on the reading of a hitherto neglected glyph of five circles. On the basis of this glyph, the following explanation is offered: The *Calendario Azteca* was a religious monument to remind the priests and the people that the world had passed through four catastrophes and that they were living in the fifth period which would come to an end one day at the conclusion of the fifty-two-year cycle. It was a reminder that the Sun required human sacrifice to avert the doom threatened by the Fire God. This stone was meant to inspire fear and was the symbol of the power of the priesthood, while the companion stone, the *Piedra de Tizoc*, was the symbol of the Aztec military power.

AN AZTEC CALENDAR STONE

THE calendar stone of Montezuma and other interesting relics of the ancient Mexican civilization have been uncovered during repairs made on the National Palace in Mexico City which houses the executive offices of President Calles. The objects are now in the National Museum adjoining the palace.

The calendar stone, the largest of the carvings found, is said by Professor Ramon Mena, head of the department of archeology of the museum, to be the votive offering of Montezuma II to the sun in return for having started auspiciously the cycle of fifty-two years beginning in 1507, hardly a dozen years before the coming of the Spanish conquerors and the fall of the Aztec empire. The preceding cycle, beginning in 1455, is represented as having been initiated with famines and other calamities.

On the sides of the huge stone block are the carved seated figures of priests. One, extending offerings, represents the Emperor Montezuma. On the top surface of the stone are symbols of sacrifice and figures of fire serpents. On the back surface are carved symbols representing the foundation of Tenochtitlan, the ancient Mexico City, and its development under the protection of the god of rain and harvest. The front surface represents the sun on the right and Montezuma on the left.

When the Spanish conquerors entered ancient Tenochtitlan, Montezuma was made a prisoner in his own palace. After his death and after the final defeat of the Aztecs under another leader early in the sixteenth century, the great temple was destroyed and the city razed to the ground. On the site of Montezuma's palace, Cortez built his own, and the present National Palace was enlarged from that. Much of the building material used came from the ruins of Aztec temples, and the relics which have been recently placed in the National Museum were dug from the ancient foundations laid down by Cortez.

Science News, Science, July 1, 1927

Missouri

THE PADUCAS

Clark, of the Lewis & Clark Expedition, in a letter to William Henry Harrison, written at Ft. Mandan on the Missouri April 2, 1805, mentions several bands of little known Indians about the heads of the Cheyenne and Platte Rivers, in connection with which he says: "It is probable that some of these bands are the remnants of the Paducar Nation."¹

In the Journals of the Lewis & Clark Expedition, mention is made under date of October 13, 1804, of several "nations who come to the Ricares to trafick and bring Horses and robes," among whom were the Paducar; another name for which appears to be Cat-tar-kah.²

And in an enumeration of the different nations encountered in connection with the regions inhabited, it is said of certain tribes that rove on the heads of the Wolf or Loup River and the headwaters of the southeastern branches of the Yellowstone and between the Cout Noire and the Rocky Mountains that "one of those tribes is known to Speak the Padoucan Language."³

¹ Lewis & Clark's Journals, Thwaites Edition, Vol. 7, p. 316, 1905.

² Ibid, Vol. 1, p. 190.

³ Ibid, Vol. 6, p. 101-102.

Under the head of "Padoucas; -- ; Padoo; Padoucies" it is stated that there were several villages; that they were very numerous, and traded with the Spanish south of them. "This nation live in Villages on the heads of River Platt & Arkansaws noumerous, well disposed, **abound in** horses, have Some [trade] with New Mexico, I can obtain no certain account of their Situation numbers &c. &c." ⁴

In 1806, President Jefferson presented to Congress a statement prepared by Clark for the Secretary of War, with additional remarks (printed by A. & G. Way, Washington, 1806), in which it is stated under the head of Padoucas:

"This once powerful nation has, apparently, entirely disappeared; every inquiry I have made after them has proved ineffectual. In the year 1724, they resided in several villages on the heads of the Kansas river, and could, at that time, bring upwards of 2,000 men into the field (see Monsr. Dupratz history of Louisiana, page 71, and the map attached to that work). The information that I have received is, that being oppressed by the nations residing on the Missouri, they removed to the upper part of the river Platte, where they afterwards had but little intercourse with the whites. They seem to have given name to the northern branch of that river, which is still called the Paducas fork. The most probable conjecture is, that being still further reduced,

⁴ Ibid, Vol. 6, 108.

they have divided into small wandering bands, which assumed the names of the subdivisions of the Paducas nation, and are known to us at present under the appellation of Wetepahatoes, Kiawas, Kanenavish, Katteka, Dotame, &c. who still inhabit the country to which the Paducas are said to have removed." ¹⁵

The matter above quoted was reprinted in a book entitled 'Travels of Captains Lewis & Clark &c. &c.' from the official communication of Meriwether Lewis, pp. 182-3, London 1809.

Ibid, Vol. 6, 108.

PADUCAS

Adelung and Vater in 'Mithridates' (Vol. 3, 1816) speak of the Ietans, which they give as another name for Camanches or Padoucas, and state that Du Pratz places them on the banks of the Kansas River.

They speak also of black and white Paducas; the black in latitude 41° on the Missouri, the white in latitude 38° on the left side of the Arkansas River, adding that the North Arm of the Platte River is still called the Paducas Fork.

Adelung & Vater, Mithridates, Vol. 3, pp. 173-5, 1816.

Spellings of Paduca (better Paduka) mainly from
Handbook Am. Indian, Pt. I, p. 328, 1907 [under Comanche]

- Padoucas, De l'Isle, Map 1712 (Siouan name - Mooney).
- Padokas Fabry (1741) in Margry Dec., VI, 475,
1886
- Padoucahs, Hutchins (1764), quoted by School-
craft, Ind. Tribes, III, 557, 1853
- Paducas, Jefferys, Fr. Dom. Am., pt. 1, map 1761
- Padonees, Morse, map 1776
- Paduka, Hervas, Idea dell' Univ., 17, 90, 1784
- Padaws, Perrin du Lac, Voy. La., 261, 1805
- Padacus, Lewis & Clark, 1807
- Padoo, Lewis & Clark, 1809
- Padoucies, Lewis & Clark, 1809
- Paducar, " " " 1809
- Padducas, Pike, Trav., 347, 1811.
- Padoncas, Brackenridge, Views of La., 80, 1815
- Shoshoni or Poduca, Latham 1860

PADUCAS

Latham, in a paper read before the Philological Society of London in May 1853 and published the following year, suggests the use of the term Paduca for apparently all of the Shoshonean tribes. He says: "It is the name given by the Pawnee Indians of the Nebraska Territory to their western neighbors on the headwaters of the rivers Platte, Arkansas, and other tributaries of the Mississippi. It contains amongst other groups the important classes of the Comanch and the Shoshoni Indians."¹

And in another paper, presented before the Philological Society May 12, 1854, he enumerates a number of Shoshonean tribes, of which he says: "I call them all Paduca, from a population so named by Pike."²

¹Latham, Proc. Philological Soc. Lond., Vol. 6, pp. 72-3, 1854.

²Latham, Opuscula, 369, 1860.

Latham, in his 'Opuscula' published in 1860, says:

"Neither are the details of the Paduca area--the area of the Wihinast, Shoshoni, Utah, and Cumanch [=Comanche] forms of speech--without interest... The Utah of the parts about Lake Utah is known to us by a vocabulary; and known to be Cumanch [=Comanche] or Shoshoni--call it which you will. I call them all Paduca, from a population so named by Pike." - Opuscula, p. 369. 1860.

Mooney states: "In 1719 the Comanche are mentioned under their Siouan name of Padouca as living in what now is western Kansas."--Handbook, 327, 1907.

Paducas - See Chittenden, Am. Fur Trade of Far West, Vol. 2, 876-877. 1902.
Identifies as probably Arapahoe, ~~see~~ agreeing with James (in Long's Exped.), that the name applied collectively to several tribes, "Arapahoes, Kiowas, etc."

PADOUCAS

Dr. George Bird Grinnell writes me under date of
May 16, 1921:

"Padouca appears to be the corruption of an Indian
term for a tribe. Jones says it is applied to the
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Montana

CROW INDIAN NAME OF THE STRIPED GROUND SQUIRREL
OF THE WESTERN PLAINS

Some years ago I asked Crow Indians of southern Montana (Absaroka Tribe) the name of the common little striped ground squirrel of their country (Ictidomys tridecemlineatus pallidas). They replied that its name was Yě^{ch}-hah-sĭch i^{ch}-kush-shă, which means 'rattle snake, live with', in reference to the belief that this little squirrel lives in the same burrows with the snakes. The name of the rattlesnake in their language is Yě^{ch}'-hah-sheh'.

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u /

— cum

Citellus 13-lineatus pallidus

Observations

The Crow Indian name of this squirrel is
Yě^{ch}-kah-si^{ch} i^{ch}-kush-shă which means Snake to live with

He refuses to ~~drop~~ believe that the ground squirrel lives
in the same burrow with the ^{rather} snake.

(Yě^{ch}-kah-sheh' = Snake; i^{ch}-kush-sha = to live with)

Told me by Crow Indians -

Sherman Bull.

Dec. 2, 1921.

MARSHAL FOCH A CROW

BUILDINGS, Mont., Nov. 28.— “Ah Way-Ke-Ta-Ra-Che-Chish” is the name by which Marshal Ferdinand Foch is known among the Crow Indian into whose tribe he was inducted at an elaborate ceremony at the Indian reservation near here this morning. The name means “Chief of Chiefs” and was bestowed upon the French Marshal by Chief Plenty Coos of the Crows. A drizzle of rain did not prevent the Marshal from taking part in the ceremony nor visiting the Custer battlefield.

~~the American reports were chiefly mythical.~~ However, it might turn out that there actually was among American negroes a worship and organized sect, as well as a system of conjuring, which latter was admitted to exist. In that case, it would probably be found that the superstition was composed of elements derived from many sources, and included European and African contributions. The difficulty was to get any evidence better than hearsay. All the accounts of the proceedings of the supposed sect, which had heretofore appeared, were based only on popular report, no more to be trusted than tales respecting European witchcraft. Such had been especially the case with Haytian accounts, which, in spite of the authority on which they had been promulgated, were merely a tissue of popular tales.

Observations on the subject were made by Messrs. PHILLIPS, ELWYN, BRINTON, WILSON, and KITTREDGE.

Mr. STEWART CULIN read a paper, prepared by himself and Mr. W. W. NEWELL, containing a collection of paragraphs, consisting of cuttings from newspapers, illustrative of negro sorcery in the United States.

The meeting then adjourned.

In the evening a reception was given to the American Folk-Lore Society by the Penn Club, at their club-house, 720 Walnut Street.

On Saturday, November 30, the Society met in the rooms of the Historical Society of Pennsylvania. Mr. V. GUILLOÛ, of Philadelphia, being in the chair.

An address on the present state of the study of folk-lore was expected from Professor T. F. CRANE, of Cornell University; but its delivery was prevented by the indisposition of Professor CRANE.

A paper was read by Rev. E. F. WILSON, of Sault Ste. Marie, Ont., on "The Kootenay Indians," of which the following is an abstract:—

The Kootenay Indians (the name being also spelt as Kutonaga) live in the space bounded by the Columbia River, the Rocky Mountains, and Clarke River, a wild country abounding in game, contained partly in Idaho, partly in Montana, and partly in British Columbia. The Flat Bows, a section of the tribe living in Canada, are canoe Indians, earning their money chiefly by canoeing for the miners. They possess several herds of horses and cattle. Their method of breaking horses consists in catching and tying the animal, then throwing at the beast buffalo skins and other objects, until it is terrified into submission. The women ride astride, quite as well as the men, and children learn to ride as early as to walk. These Indians carry on salmon fishing in the Columbia River, taking great quantities of fish by spearing or in baskets placed below the

nose, and tears of unfortunate, deserted persons are, in some tales, transformed into a human being, who later on becomes the support of his parent, and is always endowed with magical power. In Eskimo tales, to spit toward the various points of the compass is a means of producing a dense fog.

At the invitation of the University of Pennsylvania, the members of the Society proceeded to join the College Association of the Middle States in lunch at the refectory of the University.

The Society resumed its session at three o'clock.

The committee appointed to consider nominations for officers made a report as follows:—

President—Dr. DANIEL G. BRINTON, of Philadelphia.

Council—HUBERT HOWE BANCROFT, San Francisco, Cal.; FRANZ BOAS, Worcester, Mass.; G. BRÜHL, Cincinnati, O.; THOMAS FREDERICK CRANE, Ithaca, N. Y.; ALICE C. FLETCHER, Nez Perces Agency, Idaho; VICTOR GUILLOU, Philadelphia, Pa.; HORATIO HALE, Clinton, Ont.; MARY HEMENWAY, Boston, Mass.; HENRY W. HENSHAW, Washington, D. C.; THOMAS WENTWORTH HIGGINSON, Cambridge, Mass.; WILLIAM PRESTON JOHNSTON, New Orleans, La.; OTIS T. MASON, Washington, D. C.

Vacancies on the Council are to be filled by the Council itself.

These nominations were unanimously adopted.

At the afternoon session, the Secretary read a paper by Mrs. FANNY D. BERGEN, of Cambridge, Mass., on "Some Saliva Charms." (This paper will be found printed below.)

Mr. KITTREDGE enumerated some additional superstitions relative to the subject.

Remarks were also made by Dr. BOAS, and by Rev. Mr. DOUGLASS, of Philadelphia.

Mr. HENRY PHILLIPS, JR., of Philadelphia, read a poem entitled "Primitive Man in Modern Belief," its purport being to exhibit the manner in which superstition, originating in conditions of savage life, continues to influence the thought and life of mankind. (This poem will be found printed below.)

The Secretary read a paper by Miss MARY A. OWEN, of St. Joseph, Mo., on "Voodooism in Missouri."

Mr. NEWELL said that it had lately been shown that the word Voodoo was derived from Vaudois, the unpopularity of these mediæval sectaries (the Waldenses) having occasioned the reproach of sorcery to be applied to them, so that the name of Vaudois came to signify simply a witch. The reports concerning the proceedings of the Vaudoux or Voodoos of Hayti and Louisiana were substantially identical with those relating to the French Vaudois of the fifteenth century, and this correspondence had induced him to suspect that

falls. Division is made according to the number of women, each getting an equal share. These Indians during the summer, live in teepees or conical huts made of poles and covered with skins, during the winter, in log cabins plastered with mud. The dress of the men consists of a shirt of European manufacture, blanket breech-cloth and blanket leggings, the hips and outer part of the thighs being left exposed; on their feet they have moccasins, and their necks and ears are adorned with ornaments made of bears' claws and moose teeth. The women wear a loose cotton garment reaching almost to the feet, and confined round the waist by a leathern belt. Most of these people are now members of the Roman Catholic Church. Their most prevalent diseases are ophthalmia and scrofula. The bath-house for the steam baths in use among them is made by digging a hole from three to eight feet deep, and sometimes fifteen feet in diameter. This is covered with a dome-shaped roof of willow branches covered with grass and earth. Only a small hole is left, and this is closed after the bathers enter. Stones are heated red hot on the outside and passed within, and water is poured over them. In this oven, they revel for a time, singing and praying, and then plunge into the nearest stream. Sickness is supposed to be caused by an evil spirit, and the effort is to drive out this spirit from the patient. The latter is usually stretched on his back in the centre of a large lodge, while his friends sit round in a circle beating drums. The sorcerer, grotesquely painted, enters the ring chanting, and proceeds to expel the spirit by pressing both clenched fists with all his might in the pit of the stomach, kneading and pounding also other parts of the body, blowing occasionally on his own fingers, and sucking blood from the part supposed to be affected. This people are polygamous, capacity for work being regarded as the standard of female excellence. To give away a wife without a price is regarded as highly disgraceful to her family. This tribe, like all Indians, are fond of gambling, which they do by shuffling sticks, guessing in which hand a small polished bit of bone or wood is concealed, or by rolling a small wooden ring and then throwing a spear in such manner that the ring may fall over its head. But the most common form of sport is horse-racing; upon the speed of his favorite horse the Indian will stake all his possessions.

Among legends of the Kootenays, that relative to the origin of the Americans is as follows: In ancient times, they themselves and the Pesious (French Canadian voyageurs) lived together in so much happiness that the Great Spirit above envied their happy condition. So he descended to the earth, and as he was riding on the prairies on the side of the Rocky Mountains, he killed a buffalo; out of the buffalo crawled a lank lean figure, called a "Boston man," and from

that day to this their troubles began, and they will never more be in peace until they go to the land of their fathers.

They have also a tradition as to the origin of mosquitoes. Once on a time, they say, there lived on the banks of the Fraser River a bad woman who caught young children and ate them, carrying them off in a basket of woven water-snakes. One day she caught a number of little children, and carried them back into the bush in the basket. The children peeped out of the basket, and saw her digging a pit, and making stones hot in the fire, and they knew she was going to cook them as the Indians cook their meat, so they plotted together what they would do. By and by the old hag came to the basket, lifted them out, and told them to dance around her on the grass, and she began putting something on their eyes so that they could not open them. But the elder children watched their opportunity; and while she was putting hot stones into the pit, all rushed forward, toppled her over, and piled the fire in the pit on top of her till she was burned to ashes. But her evil spirit lived after her, for out of her ashes, blown about by the wind, sprang the pest of mosquitoes.

The writer cited two stories from the manuscript notes of Dr. Boas, and also acknowledged his obligations to Mr. M. Phillips, of the Kootenay agency, from whom by correspondence he had derived much of his material.

Dr. BRINTON inquired in reference to the number of hot stones used in heating the sweat-lodge. Among the Lenâpé there must always be precisely twelve, the number being doubtless connected with some mythological significance.

Mr. WILSON replied that he had not seen so many as twelve used, but had not noted the exact number.

Mr. MOONEY, of Washington, remarked that these baths were in use throughout North America. With regard to the ceremonial detail, he could not say. The sacred number was usually four, or, if not, five. Among the Cherokees it was four or seven.

With regard to rabbit-myths, mentioned by Mr. WILSON,

Dr. BRINTON remarked that the myth of the rabbit was well known in ancient Mexico. There it appears to have arisen from the notion of the natives that the figure seen in the full moon is that of a rabbit. It was called *tochtli*, the rabbit, and the name was applied to one of the four types under which the years were grouped in the Aztec cycle. The animal was not considered astute, but the reverse, and the gods who presided over the silly stage of inebriation were called *totochtin*, the rabbits, and are so portrayed in the Aztec picture-writing.

Mr. JAMES MOONEY, of the Bureau of Ethnology, read a paper on the "Cherokee Theory and Practice of Medicine," giving an account

Chief Wah - Ha - Gun - Ta

OR
BUFFALO RIBS

Chief Wah-Ha-Gun-Ta

[OR BUFFALO RIBS]

HS DECLARED to be the oldest human being in the world, having been born in 1771, in the region now known as the Glacier National Park, Mont. According to well-authenticated tradition, he was the first Red Man in that territory to visit the Great White Father, and his journey to the National Capital when Pres. Jefferson was in the White House was a memorable event in his life.

He is regarded in his tribe as an oracle. At the time of his birth, so the Indian legend goes, the Father of all Spirits, standing on a mountain, shot an arrow near his father's tepee. The prophecy is interpreted by the Medicine Men to be that the child boy would live forever and assist the Gods in their councils. He was a great hunter in his younger days, and claims to have killed thousands of buffaloes.

His eyesight and hearing at the present time (1912) are very good. His teeth are intact, but worn down nearly to the gums. The wrinkles on his face are so deep that he could hide a ten-cent piece in them; his memory is good, and he declares that he well remembers Lewis and Clark and their western trip, and he readily picks out their pictures from a number of others. He has braved the storms of 141 winters, and is still hale and hearty. Chief Buffalo Ribs has been married, so he claims, thirty-two times and has relatives by the hundreds.

He is a large, powerfully built man, and his eye shows marked intelligence and a cunning worthy of his race. He does not like notoriety and shuns society and is now passing his days with his tribe in Montana, respected by the whites and worshiped by the red men.



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Livingston Mont

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Retake of Preceding Frame

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[OR BUFFALO RIBS]

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Retake of Preceding Frame

Nevada

NEVADA HISTORY

1848-Sept. 9, 1850 Nevada was part of California, known as the Washoe Country.

1850-Mar. 2, 1861 Nevada was included in the Territory of Utah.

1861-1864 Nevada was called Nevada Territory. (the Territory of Utah was divided in 1861 and the western portion called Nevada.)

Oct. 31, 1864 Nevada became a state.

NEVADA

Ross Browne's 'Resources of the Pacific Slope' published in 1869 contains an important chapter on Nevada (pp.299-442); also an 'Historical sketch of Nevada', with boundaries, population, aboriginal inhabitants, early settlements, &c. (pp.185-198), containing matter on the Washoes, Pah-Utahs, Shoshones, Bannocks, Toquimas, and Monos.

The first mentioned chapter contains the following:

"Mono Lake, lying about ten miles southwest of the dividing line between California and Nevada, derives its name from the tribe of Indians originally inhabiting the vicinity." (Page 303).

Besides this, there is a long account of Lower California by Alexander S. Taylor, with separate pagination.

While following south along East Walker River, Jan. 24, 1844, Fremont discovered a man running towards the camp as they were about to break camp in the morning, who proved, he says, "to be an Indian of rather advanced age — a sort of forlorn hope, who seemed to have been worked up into the resolution of visiting the strangers who were passing through the country. He seized the hand of the first man he met as he came up, out of breath, and held on, as if to assure himself of protection. He brought with him in a little skin bag a few pounds of the seeds of a pine tree, which to-day we saw for the first time, and which Dr. Torrey has described as a new species, under the name of pinus monophyllus; in popular language, it might be called the nut pine. We purchased them all from him. The nut is oily, of very agreeable flavor, and must be very nutritious, as it constitutes the principal subsistence of the tribes among which we were now travelling. By a present of scarlet cloth, and other striking articles, we prevailed upon this man to be our guide of two days' journey. As clearly as possible by signs, we made him understand our object; and he engaged to conduct us in sight of a good pass which he knew. Here we ceased to hear the Shoshonee language; that of this man being perfectly unintelligible. Several Indians, who had been waiting to see what reception he would meet with, now came into camp; and, accompanied by the new comers, we resumed our journey".

— Fremont: Expl. Expd. to Oregon & Calif. (1844), 221, 1845.

New Mexico: Navaho



An Exhibition of Paintings
of Navaho Myths by
Laura Adams Armer
will be held at the
Ainslie Galleries
New York City

NOVEMBER 16 TO 30 INCLUSIVE
677 ~ FIFTH ~ AVENUE
1925



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Retake of Preceding Frame

CATALOGUE

- 1 The Four Winds
- 2 The Song Makers
- 3 Ini – the Thunder
- 4 Zenith
- 5 Placing the Stars
- 6 In the Butterfly House
- 7 Naestsan – Earth Mother
- 8 Yadilyil – Sky Father
- 9 Tsenahale – Navaho Harpies
- 10 Klehanoai – The Moon Bearer
- 11 Valley of the Gods
- 12 Daughter of the Dawn

CATALOGUE

- 13 Yol kai Estsan – White Shell Woman
- 14 Lonely on the Mountain
- 15 Storm
- 16 House of the Sun
- 17 The Seeker
- 18 The Butterfly Goddess
- 19 Old Oraibi
- 20 Water Bearer
- 21 Navaho Hogan
- 22 Red Hat
- 23 Tsebitai

NAVAHOS DO NOT EAT BEAR

The late Dr. Edward Palmer states that the Navaho Indians "do not eat bear's meat, and to call a man a bear is a term of great reproach. "

Am. Nat. Vol.12, No.5, p.313. May 1878.

~~When pondering one's state of mind as the result of the reading of this study, one is inclined to compare one's self to a spectator of a tragedy and say with Aristotle: my emotions were purified even though the tale was sad.~~

ALEXANDER GOLDENWEISER

Navaho Weaving: Its Technic and History. CHARLES AVERY AMSDEN. (xviii, 261 pp., 12 figs, 123 pls. Santa Ana, California: The Fine Arts Press, 1934.)

Mr Amsden's detailed study of Navaho fabrics is a notable contribution to the subject of historic textiles. He has organized information from scattered sources for the ethnologist, and presented much interesting material which will appeal especially to those readers who think of the Navaho as the outstanding (if not the only) weavers of the Western hemisphere.

In appearance the book is a beautiful piece of work. Colored plates, to mention only one feature, reproduced upon bookbinder's linen suggest the actual texture of the weavings. They include as the author says, "every specimen of Navaho weaving I have ever seen which had a history acceptable to me dating it prior to the year 1880, . . . with a few exceptions where photographs were not obtainable or the tribal origin was doubtful" (p. 205).

The book is divided into two approximately equal parts. Chapters under Tecnic deal with finger weaving (plaiting, looping, and twining), loom development in America, the Navaho loom, and the types and uses of Navaho textiles. I believe that those who have struggled with the problems involved in such descriptions will agree with me that the chapters on weaving devices and fabrics are simply and effectively written. I cite as a particularly good example of clearness the description of the Two-faced Weave including the drafts and the sketches of a partly completed reconstruction (pp. 57-62).

The second part of the book, the historical, emphasizes those factors which contributed to Navaho weaving as it developed from its earliest known phases to its modern aspects. Expeditions, exploratory and punitive, governmental experiments emanating from old Spanish and American centres, and the voluntary as well as compulsory movements of the tribe form the background of events. Interpolated sections break into the chronological presentation of the life of the people to summarize and focus attention upon the growth of the weaving craft and its comparatively rapid evolution into tribal industry.

Students of American textiles will be grateful for the full treatment accorded to the debated subject of bayeta and its successors. This word has been used too loosely to avoid resultant confusion. Mr Amsden sums up bayeta's contribution to weaving in the following: "The bayeta period marked the high point, the 'Golden Age' of Navaho weaving. . . . Only an expert could wed native wool and bayeta fibre in a harmonious and happy union" (p. 150).

The last fifty pages of the book record the blanket-to-rug transition period, the arrival of commercial yarns and dyes, and the "boom" times in Navaho weaving.

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Retake of Preceding Frame

NAVAHO WEAVING

CHARLES AVERY AMSDEN

FOREWORD BY

FREDERICK WEBB HODGE

ANNOUNCING

THE PUBLICATION ON NOVEMBER 15, 1933

OF

NAVAHO WEAVING

ITS TECHNIC AND HISTORY

BY

CHARLES AVERY AMSDEN

WITH A FOREWORD BY

FREDERICK WEBB HODGE

TO BE PUBLISHED BY

THE FINE ARTS PRESS
SANTA ANA, CALIFORNIA

IN CO-OPERATION WITH
THE SOUTHWEST MUSEUM

LONG interested in the Navaho through a boyhood spent on the edge of their reservation in New Mexico, Mr. Amsden four years ago set himself the task of making a comprehensive study of their principal craft, that of weaving. The rich stores of Southwestern lore amassed in the libraries of Southwest Museum gave him access to nearly everything ever written on the subject, all of which was carefully read and noted. A tour of the principal museums of the United States yielded more than two hundred color drawings of Navaho blankets, with notes and historical data where available. Several visits were made to the Navaho country for interviews with native craftswomen (for this woman's craft), pioneer Indian traders, and rug dealers. The photographic files of Southwest Museum, Laboratory of Anthropology, the War Department at Washington, and many professional and amateur photographers, yielded a rich harvest of historic pictures, several dating back to the 1870's. In short, no effort was spared to make a thoroughly documented and amply illustrated account of both the technical processes and the historic growth of this ancient and important craft as practised by the Navaho.

Part I is devoted to the technic of the craft. It resumes our archeological knowledge of the long career of the loom and its prototypes in the prehistoric Southwest, describes and illustrates in detail the various weaves used by the Navaho, and records the processes followed in making their native dyes. The second part, historical, traces Navaho weaving from the introduction of the first sheep by Spanish colonists, through its earliest historical references in old Spanish documents and its brilliant "bayeta period" to modern times when, as the author says, it was gradually transformed from a native craft of blanketry into a rug-making industry. An account of the interesting "revival" movement now in progress closes the book, preceded by a chapter analyzing and tracing the growth of design.

The illustrations are of great value in themselves. Instead of specializing in "pretty blankets," as previous writers have been prone to do, Mr. Amsden has made a special effort to obtain illustrations of old authentically dated specimens; and through the generous coöperation of museums and private collectors the country over a group of excellent photographs of more than one hundred such blankets has been assembled. Many date back to the Civil War and even earlier. These with the historic old scenes and figures of early reservation days and the ample illustrations of every process in blanket-making far surpass any previous effort along that line.



HENRY NAPPY, A TEWA FROM HANO PUEBLO, DEMONSTRATES PUEBLO SPINNING AND WEAVING. COURTESY OF MR. FRED H. HINCHMAN.

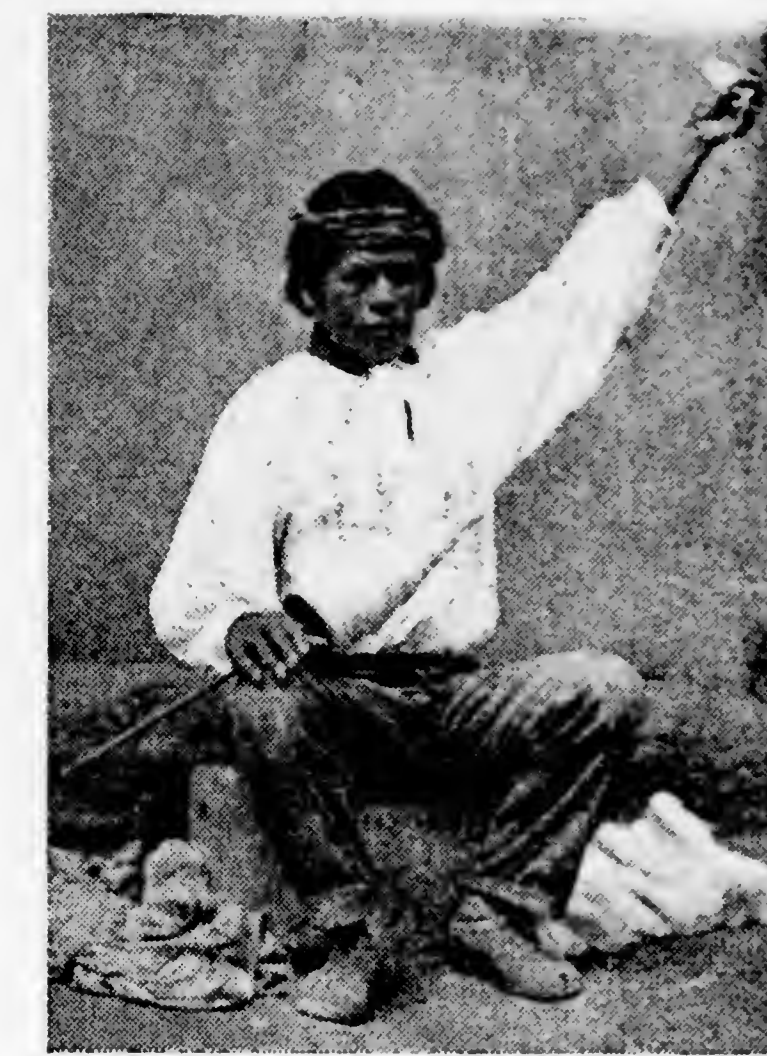


NAVAHO WOMEN SHEARING SHEEP. AN OLD PHOTOGRAPH, PROBABLY TAKEN IN THE VICINITY OF FORT DEFIANCE ABOUT 1890 COURTESY SIGNAL CORPS, U. S. ARMY.

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HENRY NAFFRY, A TEWA FROM HANO, BUDDLO, DEMONSTRATING THE PROCESS OF WEAVING. COURTESY OF MR. FREDERICK H. HARRIS.



NAVAHO WOMEN SHEARING SHEEP. AN OLD PHOTOGRAPH, PROBABLY TAKEN IN THE VICINITY OF FORT DEFIANCE ABOUT 1880. COURTESY NATIONAL ARCHIVES, U. S. ARMY.

The volume will contain approximately two hundred pages of text, one hundred and twenty pages of plates and illustrations, and seven full page plates of Navaho blankets reproduced in their beautiful colors. The color plates will be reproduced on a material very closely resembling the weave of the blankets.

The edition will be printed on Strathmore white Broadcaster text. Page size is 6 x 9 inches. Bound in heavy cloth over boards with a blanket reproduced thereon. The treatment of the volume will present a very striking appearance. Only a limited number will be printed.

The Fine Arts Press in the past has sold its editions in a remarkably short time and feels sure that "Navaho Weaving" will meet as ready response as did "Chinigichinich," "Camino Viejo," "Shadows of Old Saddleback," "Blockprints of the Southland," and "Spanish Explorations in the Strait of Juan de Fuca."

The price for single copies will be \$7.50. Cash in advance subscriptions may be made until November 10, 1933 at \$6.50.

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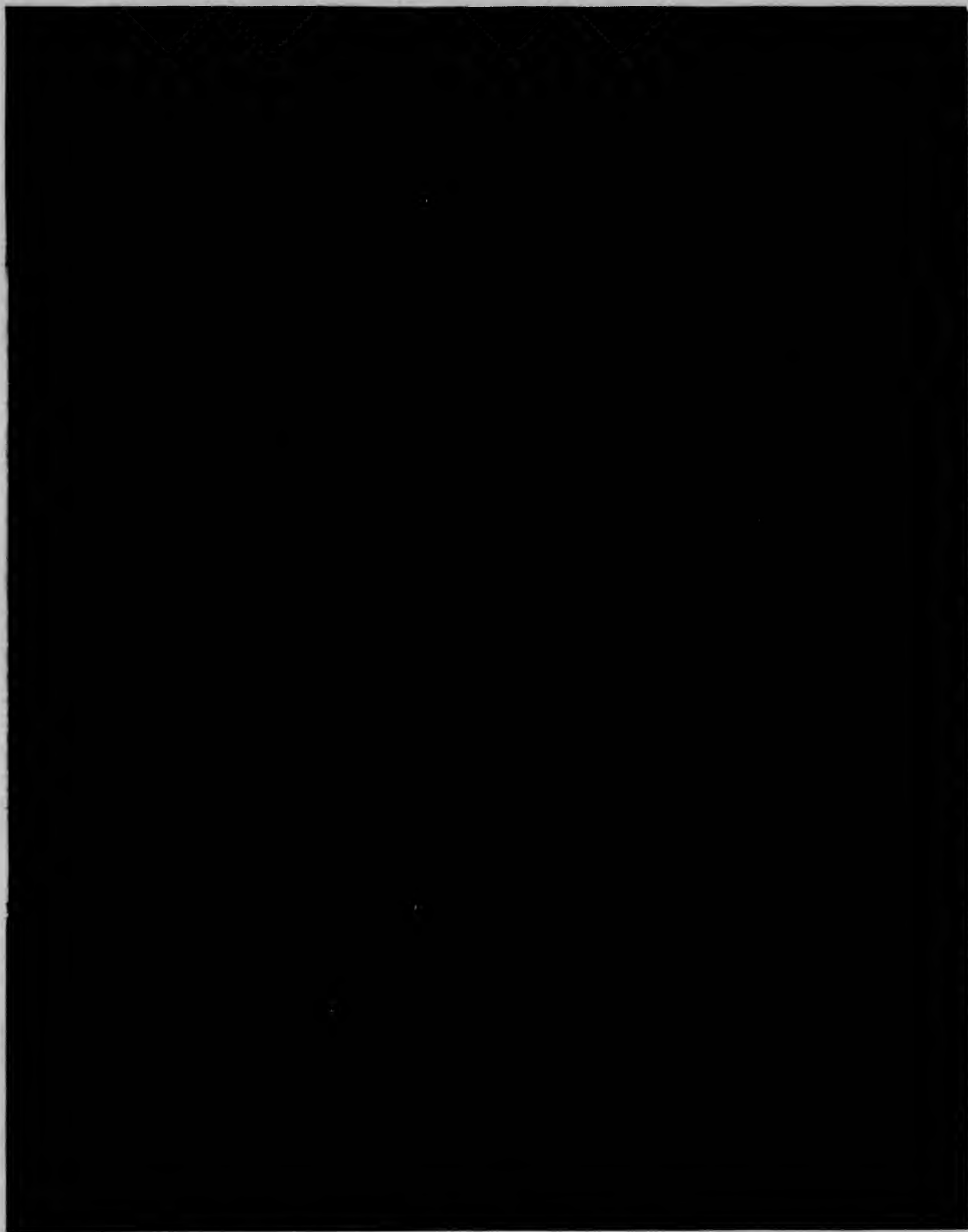
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SETON INSTITUTE

*A Summer School
of Indian Arts-Crafts-Wisdom*



SANTA FE — NEW MEXICO

SETON INSTITUTE

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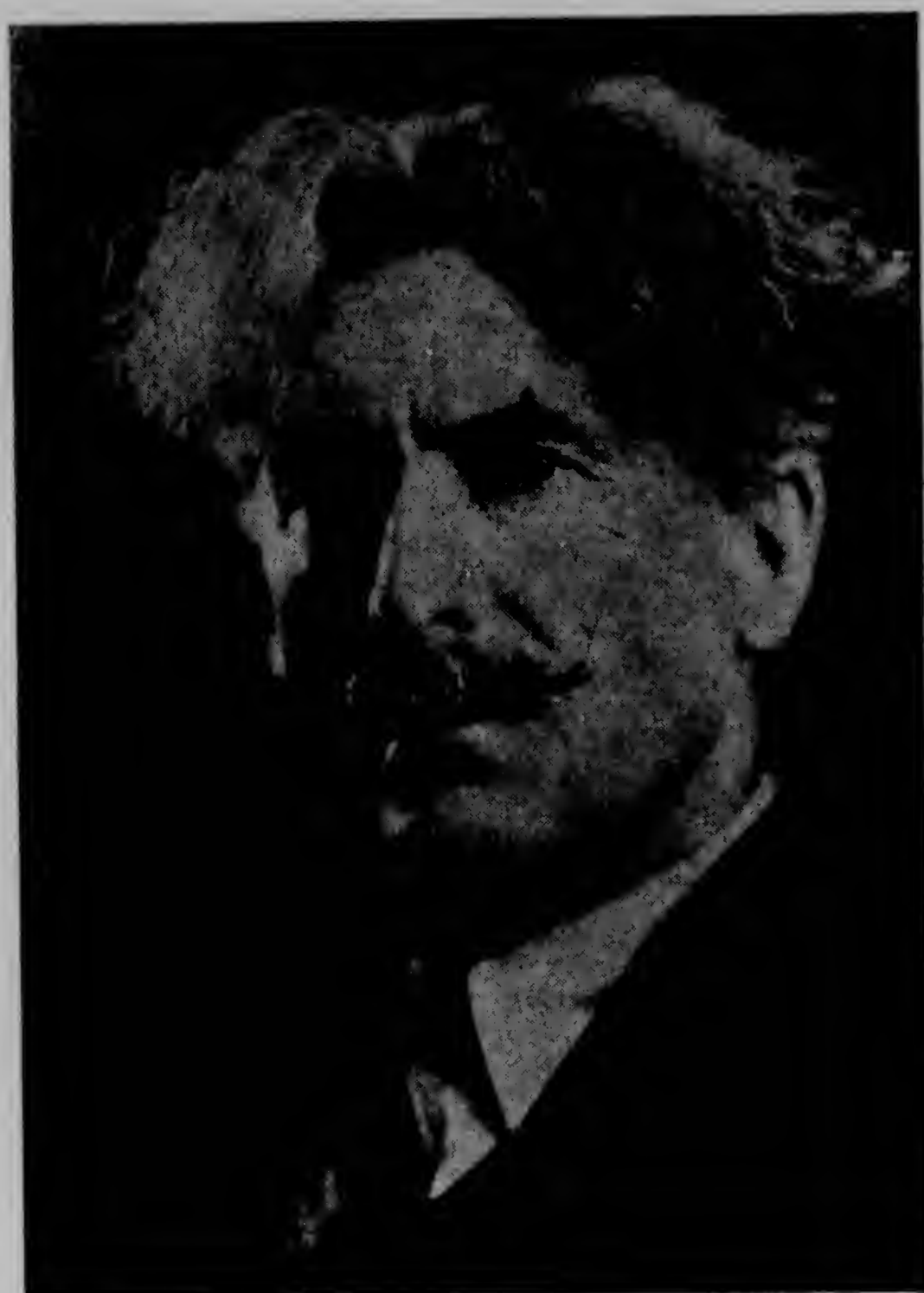
SANTA FE — NEW MEXICO

Retake of Preceding Frame

President
Ernest Thompson Seton

Dean
Julia M. Seton

Honorary President
Edgar L. Hewett



Ernest Thompson Seton



INTRODUCTION

The purpose of this booklet is to acquaint you with Seton Institute, a Summer School of Indian Lifecraft, founded by Ernest Thompson Seton in 1902, and located in the beautiful wooded mountain country of northern New Mexico, close to Santa Fe and on the Old Santa Fe Trail. The setting is rich in the early Red and White American history, a land that is ancient and new, where Indian, Spanish, French and Mexican have conquered and lost to American frontiersmen, who have given us one of the most scenic and delightful spots on the American continent.

It is here among the pines and rugged mountains, where cool invigorating mountain air stimulates weary bodies and jangled nerves, that Ernest Thompson Seton has built this College, a College where educators, people of science, and children may come and study the life of the ancient Red man, his ideals and philosophy, his art, crafts, his wisdom of the great out-doors, his rhythm of dance, song, and life itself.

Interesting, inspiring and enriching, these courses offer you a combination of vacation and education. The lure of the West, the splendor of the mountains and the beauty of its great outdoors, plant you in a paradise of new wonders, where life abounds, where peace reigns, and where the fullness of both renew the joy of being alive.



*Recd. from Seton in person
Dec. 7, 1935. - CWM*



SETTING

SETON INSTITUTE is a 2,500-acre tract, part of the old grant from the King of Spain to Governor De Vargas.

Its Campus consists of the following:

12 modern cottages with all conveniences, equipped for complete housekeeping,—furniture, dishes, linen and blankets (if desired), etc. These cottages range from 2 to 13 rooms; and in all can accommodate 50 persons.

The Indian Village, which can accommodate 70 students. The habitations are, some of them log cabins, some tepees, some tent houses. There is a Navaho Medicine Hogan which is the general assembly hall or auditorium; a Sweat Lodge (or Turkish Bath); Craft rooms which are in the form of Seminole Lodges, pine-thatched, always cool and comfortable; Showers,, etc.; a Dining Hall with piano; a modern Kitchen.

The Craft Unit, which contains a number of large craft shops for indoor work, a large Museum of Indian products, an Art Gallery, Tool Shops, Supply Rooms, etc.

A Library of 10,000 volumes pertaining chiefly to our own subjects, but amply covering related fields of study.

A Lecture Hall equipped for stereopticon work, with lantern, silver screen, etc.

A large Dance Studio for the teaching of folk dances, equipped with piano, victrola, etc., and including a comprehensive music library.

An Observatory for the study of Astronomy, not yet, however, equipped with telescope.

A Roof Garden for evening parties.

Stables, Corrals, etc., with horses, under riding masters.

An Archery Meadow for instruction in bow-and-arrow work.

A Laundry for the use of students.



AIM

The course is for both men and women,—camp directors, camp counselors, leaders of all outdoor and indoor recreational organizations, playground supervisors, school teachers, etc., or those aspiring to be such. No previous training is required. There is a minimum age limit of 18 years.

The course aims to train those persons, who are or wish to be leaders in the recreational guidance of others. It emphasizes Indian thought throughout, selecting the best ideals of the best Redmen of the past and present.

It offers a program for both indoors and outdoors, for both sexes, and all ages, viz., for the kiddies under 12, for those between the ages of 12 and 18, and for wholly adult groups.

All instruction is of a practical nature, every member taking an active part. Formal lecturing is reduced to a minimum, and classroom work, in the ordinary sense of the word, is unknown.





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Retake of Preceding Frame



PERSONNEL OF FACULTY

The staff consists of the best available experts in each field. During the past three years, there has been a faculty of 42 instructors each session, not all full-time; some coming in for their particular lectures or classes.

In a sense, practically every instructor is also a student. For example, the Art Instructor may take the course in Indian Dancing. This unanimity of interest makes for good camp spirit and general esprit.

A number of Indians are employed as instructors and demonstrators. In some cases, besides the Indian teacher, a White expert works in conjunction.

COST

The cost is given below, and includes tuition, board, camp lodging, and transportation on the field trips.

1 week	\$ 35.00
2 weeks	68.00
3 weeks	98.00
4 weeks	\$128.00
5 weeks	155.00
6 weeks	175.00

Handicraft materials may be bought at the Supply Department of the Institute, at reasonable rates. While the cost of the materials depends on the choice of subject, in all probability \$5.00 would cover all the necessary materials for the Introductory Course; \$7.50 for the Advanced.

There is a Laboratory fee of \$5.00 which covers needles, cotton threads, paste, glue, paints, solder, turpentine, gasoline for craft work, adhesive tape, use of scissors, and such other small items as are difficult to pro-rate.



COURSES

The courses as given below may be changed in detail, but the main outline is as herein:

ART. I. INTRODUCTORY—

Simple Navaho Weaving, Wool Embroidery, Loom Beading, Beaded Rosettes, Beaded Thongs, Smoke Prints, Spatter Prints, Grass Mats, Rattles, Arm and Leg Bands, Simple Indian Costuming, Councils.

ART II. ADVANCED—

Navaho Weaving, Pottery, Masks, Tom Toms, Fire Sets, Fire Making, Peace Pipes, Councils.

ART III. INTRODUCTORY—

Basketry, Painted Robes, Rattles, Arrow Chipping, Indian Design, Willow Beads, Painted Placques, Dancing Bustles, Councils.

ART IV. ADVANCED—

Tombes, Katchinas, Breast Plates, Parfleche, Quill Embroidery, Moccasins, Horn and Bone Work, Puppets, Councils.

SOCIAL SCIENCE I. INTRODUCTORY and ADVANCED—

Lectures on Indian Philosophy, History, Life, Legendry, Art, Poetry, Drama, Councils.

SOCIAL SCIENCE II. INTRODUCTORY and ADVANCED—

Indian History, including lectures and field trips.

MUSIC I. INTRODUCTORY AND ADVANCED—

Indian Musical Instruments, Indian and Folk Music, Tom Tom Orchestra, Councils.

PHYSICAL EDUCATION I. INTRODUCTORY and ADVANCED—

Indian Dancing, European Folk Dancing, American Pioneer Dancing, Games, Councils.

NATURE STUDY I. INTRODUCTORY and ADVANCED—

Mammals, Birds, Plants of the region, Taxidermy, Plants as Food, Plants as Medicine, Vegetable Dyes, Hikes, Outdoor and Primitive Cookery, Overnight Camping, Councils.

MISCELLANEOUS. INTRODUCTORY and ADVANCED—

Story Telling, Animal Imitation, Sign Talk, Indian Well, Organization of Groups, Group Management, Councils, etc.



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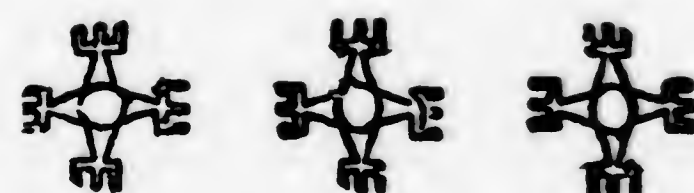
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ART II. ADVANCED—

Navaho Weaving, Pottery, Masks, Tom Toms, Fire Sets, Fire Making, Peace Pipes, Councils.

ART III. INTRODUCTORY—

Basketry, Painted Robes, Rattles, Arrow Chipping, Indian Design, Willow Beads, Painted Placques, Dancing Bustles, Councils.

ART IV. ADVANCED—

Tombes, Katchinas, Breast Plates, Parfleche, Quill Embroidery, Moccasins, Horn and Bone Work, Puppets, Councils.

SOCIAL SCIENCE I. INTRODUCTORY and ADVANCED—

Lectures on Indian Philosophy, History, Life, Legendry, Art, Poetry, Drama, Councils.

SOCIAL SCIENCE II. INTRODUCTORY and ADVANCED—

Indian History, including lectures and field trips.

MUSIC I. INTRODUCTORY AND ADVANCED—

Indian Musical Instruments, Indian and Folk Music, Tom Tom Orchestra, Councils.

PHYSICAL EDUCATION I. INTRODUCTORY and ADVANCED—

Indian Dancing, European Folk Dancing, American Pioneer Dancing, Games, Councils.

NATURE STUDY I. INTRODUCTORY and ADVANCED—

Mammals, Birds, Plants of the region, Taxidermy, Plants as Food, Plants as Medicine, Vegetable Dyes, Hikes, Outdoor and Primitive Cookery, Overnight Camping, Councils.

MISCELLANEOUS. INTRODUCTORY and ADVANCED—

Story Telling, Animal Imitation, Sign Talk, Indian Well, Organization of Groups, Group Management, Councils, etc.

Retake of Preceding Frame



ORGANIZATION OF THE COURSE AND CREDITS

The Adult Course runs for six consecutive weeks of 6 days each. Except on the days set apart for field trips or museum tours, there are scheduled 8 periods each day. This includes the evening class.

No student will be permitted to take more than 7 periods a day.

Students not working for college credits may take as few periods as they desire; but the diploma of the Institute will be issued only to those who take a minimum of 4 periods each day, also the field trips and museum tours.

Students satisfactorily completing a course of 1 lecture and 4 craft classes, or 2 lectures and 2 craft classes, each day for six weeks, and turning in a note book which is passed by the various instructors, will be entitled to 9 quarter-term hours of college credit.

Students who pass the above requirements for four weeks, may claim 6 quarter-term hours of college credit.

No credit will be allowed for less than 4 weeks work.

For college credit work, graduation from a standard High School is required; also matriculation with the New Mexico Normal University, where our credits are recorded. This, unless already done in a former year, costs \$5.00, payable to the University.

Students working for college credit must enter at the beginning of the course. Those not working for credit may enter the course at any time during the term, provided the school is not full.

* * * * *

The course is divided into Introductory and Advanced classes.

The Introductory Course must be taken by anyone who has never before attended our courses or any similar courses.

An Introductory student may not take an Advanced subject, except in the case of certain classes or lectures, designed for both.

An Advanced student may substitute an Introductory subject for an Advanced subject if it will better suit his needs.



FIELD TRIPS

Each week there is a field trip to some point of special interest. These trips usually occupy a full day; occasionally an overnight trip is introduced.

The probable trips for this year are as follows:

Pecos Ruins. This is a prehistoric site, about 25 miles from the Campus; one of the landmarks of the Old Santa Fe Trail. Here we spend half a day; then travel up the glorious Pecos River, and picnic for the rest of the day.

Santo Domingo Corn Dance. This is a pueblo, situated about 40 miles from the Institute grounds, on the Rio Grande. It is the most populous of all the pueblos, and decidedly the most conservative. Here White influence has had the least effect, and they carry on their old traditions in the ancient manner. On August 4th, the day planned for our visit, they celebrate the Green Corn Ceremonial, a religious ritual which is a tribal prayer for rain. The dance, in which several hundred participate, lasts all day—and is invariably followed by a heavy flood.

San Indefonso. This pueblo is situated about 30 miles north of Santa Fe, and is the home of the best potters in America. It is a veritable art center, for besides pottery, they turn out creative work in painting and other arts. Here we visit with the Indians, as they carry on their daily work, and realize more than in any other way, the foundation of their kindly and happy faces.

Frijoles Cliff Dwellings. Perhaps the most beautiful and romantic spot in the Southwest. The cliff dwellings, the great community house, the ancient kivas, the ceremonial cave, the Sun House,—all intrigue the imagination until one comes back to camp steeped in the life of the Ancients, and saturated with the racial spirit of the Redman.



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Students satisfactorily completing a course of 1 lecture and 4 craft classes, or 2 lectures and 2 craft classes, each day for six weeks, and turning in a note book which is passed by the various instructors, will be entitled to 9 quarter-term hours of college credit.

Students who pass the above requirements for four weeks, may claim 6 quarter-term hours of college credit.

No credit will be allowed for less than 4 weeks work.

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Retake of Preceding Frame



Santa Clara. A pueblo some 30 miles from Santa Fe, with an interesting political history which nearly ruined the life of the inhabitants, with its two factions,—one, the conservative group who were all for the preservation of the old order of things; the other, the “progressive,” which is determined to introduce the ways of the White-man. The art of pottery-making is retained, and beautiful work is turned out. On the day of our visit, the pueblo is celebrating its annual fiesta.

Taos. The northernmost of the Rio Grande pueblos, 75 miles from Santa Fe. The trip up the Taos Canyon is one of the never-to-be-forgotten sights of one's life. For miles, the road runs along the river, bounded by cottonwoods and poplars. The view down into the gorge below, just before entering the town, is a thrill.

The town itself is in two parts, separated by a little stream. Each part consists of a large terraced community structure, six stories high. Here we spend what is left of one day after the drive, at the Indian pueblo, where our interests center in the crafts which are still practiced, but more in the splendid dancing of the Taos Indians. We camp overnight in the canyon where is to be found still the Kit Carson Spring. The next day, we spend at the Artists' Colony, where we have an unusual entree. A number of these painters were classmates of Mr. Seton's forty years ago in Paris; and always are ready for us with an hospitable welcome. We return to camp for the second night.

* * * * *

Museum Tours. Besides these whole-day trips, there is one afternoon each week assigned for a visit to the various places of interest in the nearer vicinity of Santa Fe. These include, first, a general tour of Santa Fe itself; the School of American Research; the Laboratory of Anthropology; the U. S. Indian School; the Palace of the Governors; the Turquoise Mines, etc.

* * * * *

These field trips and tours are always preceded by a lecture on the place to be visited, making the student acquainted with the history, etc.

Transportation is provided in buses of the Institute, without charge..



SETON VILLAGE CHILDREN'S CAMP

The Children's Camp is situated close to, but entirely separate from the Adult Camp. It is wholly self-contained, with its own habitations, its own water supply, sanitary conveniences, showers, craft rooms, auditorium, etc.

The children are divided into three age groups; viz., those under 8 years of age, those from 8 to 12, and those over 12. With the added division between girls and boys, this gives us six groups of small numbers.

The management will not take more than 30 children, so that each can receive personal individual attention to his particular needs.

For some of the classes, the boys and girls mix; in others, they are kept separate. They are all under the trained guidance and supervision of experts for 24 hours of each day, though they themselves are not always aware of it. Their instructors are in some cases the same as are working with the adults; but the program is, of course, scaled to their ages.

The subjects treated are, in part, as follows: Nature Study, Indian Lore, Indian Legendry, Indian Arts and Crafts, Indian Dancing and Song, American Pioneer Dancing, European Folk Dancing, Metal Work, Horn and Bone Work. The crafts are all taught in practical fashion, each child completing the projects in which he is working.

The children have a class in Horseback Riding each day, under an expert riding master. They are also taught Archery in its simpler forms.

They are housed in either stucco bunk houses or log cabins. They are in charge of an adult who sleeps with them or in an adjoining cabin, always at call. In some cases, where the children desire, and where the Director feels it advisable, two children are permitted to sleep in a tepee. The tepees, however, are close to the other cabins, so they are under supervision all the time.

The auditorium for the children is a Pueblo Kiva, authentic and impressive. It is from the top of this Kiva that the Morning Call to rise is given each day, and the Closing Song at night. These are both Indian Songs used for the purpose by the Zuni Indians themselves. It establishes an atmosphere quite different from that obtained by the use of bugle, whistle, or other device.



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Retake of Preceding Frame



The Children's Dining Room is a wing of the main Dining Room. Here they are under the supervision of adults, who see to it that they eat wisely and well. Table etiquette is by no means lost sight of, good manners being instilled all the time, chiefly by example.

The dishes in the Dining Room are hand-made Mexican pottery, thus giving an atmosphere of the esthetic which we feel is very desirable. The table glassware is also Mexican hand-made; the soup bowls, abalone shells of matchless beauty from the Pacific Coast.

Our Kitchen is under the guidance of an expert dietician. Our cook has been with us for many years, coming each year all the way from the West Coast. She has a number of assistants, so that the meals are safeguarded in every possible way. Our equipment is of the most modern.

We raise most of our own vegetables; what we do not raise ourselves, we buy from neighboring farms.

Our camp is inspected each year by the State Health Department. The water is from our own artesian wells, and is regularly tested. Our milk is from a tuberculin-tested herd.

The children are required to observe a rest hour after luncheon, giving an opportunity for relaxation and complete rest between morning and afternoon activities. They need not sleep if they are past the age of naps; but the relaxation is necessary, especially in this high altitude, where they are apt to be high-strung for a time after entrance to the camp.

The children are taken on field trips, as are the adults, but sometimes they are not the same trips. Some of the adult trips are too fatiguing for their ages. But they see much of the Indians in their own ways of life, and get a better idea of American history than the schools have been able to give them.



COST

The rate for the eight weeks is \$250.00. This includes tuition, board, lodging, handicraft materials, transportation on the field trips,—in fact, everything except personal laundry, and outside doctor bills should these be necessary.

We request that parents do not send the children food of any kind. Everything necessary for their good is included in the camp menus. If a parent should feel that he must send something of the kind, please send it to the office of the Dean, who will see that it is properly distributed and at the right time.

Very little spending money should be given the children. Occasionally, they may wish to buy a piece of pottery or other Indian product; but it is better to deposit such spending money with the Dean, who will render an itemized account at the end of the season.

We require no regulation camp outfit, thus necessitating a minimum of outlay on the part of the parent. A list of required clothing, etc., will be sent on request.

Address all communications to

SETON INSTITUTE,
Santa Fe, New Mexico.





The Children's Dining Room is a wing of the main Dining Room. Here they are under the supervision of adults, who see to it that they eat wisely and well. Table etiquette is by no means lost sight of, good manners being instilled all the time, chiefly by example.

The dishes in the Dining Room are hand-made Mexican pottery, thus giving an atmosphere of the esthetic which we feel is very desirable. The table glassware is also Mexican hand-made; the soup bowls, abalone shells of matchless beauty from the Pacific Coast.

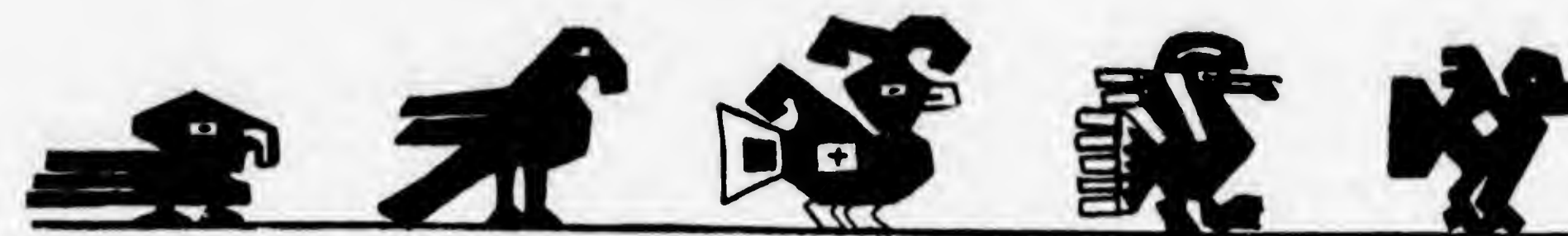
Our Kitchen is under the guidance of an expert dietician. Our cook has been with us for many years, coming each year all the way from the West Coast. She has a number of assistants, so that the meals are safeguarded in every possible way. Our equipment is of the most modern.

We raise most of our own vegetables; what we do not raise ourselves, we buy from neighboring farms.

Our camp is inspected each year by the State Health Department. The water is from our own artesian wells, and is regularly tested. Our milk is from a tuberculin-tested herd.

The children are required to observe a rest hour after luncheon, giving an opportunity for relaxation and complete rest between morning and afternoon activities. They need not sleep if they are past the age of naps; but the relaxation is necessary, especially in this high altitude, where they are apt to be high-strung for a time after entrance to the camp.

The children are taken on field trips, as are the adults, but sometimes they are not the same trips. Some of the adult trips are too fatiguing for their ages. But they see much of the Indians in their own ways of life, and get a better idea of American history than the schools have been able to give them.



COST

The rate for the eight weeks is \$250.00. This includes tuition, board, lodging, handicraft materials, transportation on the field trips,—in fact, everything except personal laundry, and outside doctor bills should these be necessary.

We request that parents do not send the children food of any kind. Everything necessary for their good is included in the camp menus. If a parent should feel that he must send something of the kind, please send it to the office of the Dean, who will see that it is properly distributed and at the right time.

Very little spending money should be given the children. Occasionally, they may wish to buy a piece of pottery or other Indian product; but it is better to deposit such spending money with the Dean, who will render an itemized account at the end of the season.

We require no regulation camp outfit, thus necessitating a minimum of outlay on the part of the parent. A list of required clothing, etc., will be sent on request.

Address all communications to

SETON INSTITUTE,
Santa Fe, New Mexico.



Retake of Preceding Frame



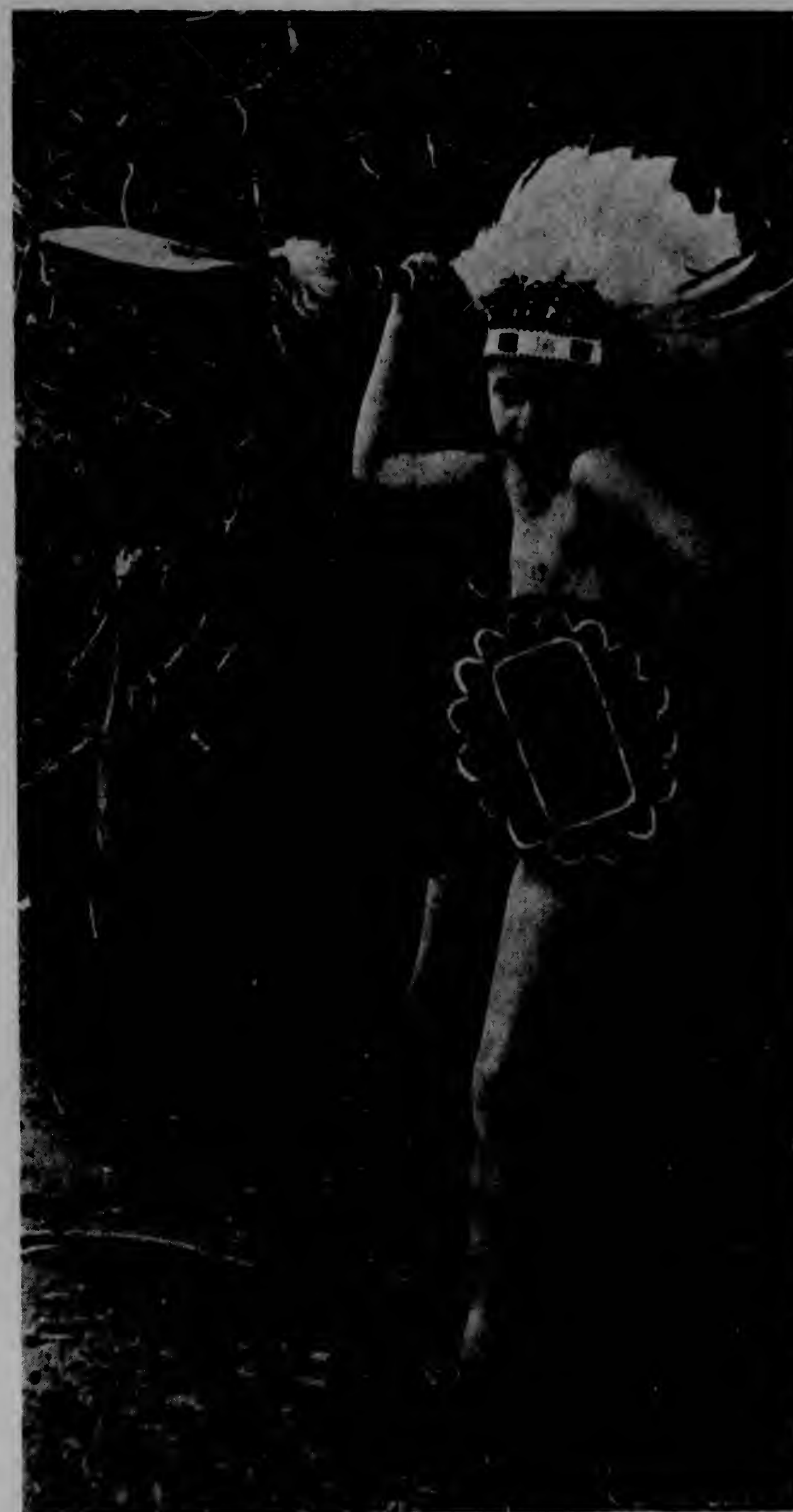
To those, Adults or Children, who have never been in the glamorous West, seen the beauty of its rugged mountains, felt the thrill of the great outdoors or travelled over the ruins of ancient cities of the fast disappearing Redman, there will open up here a new treat . . . an educational vacation. For Seton Institute offers you that splendid combination.

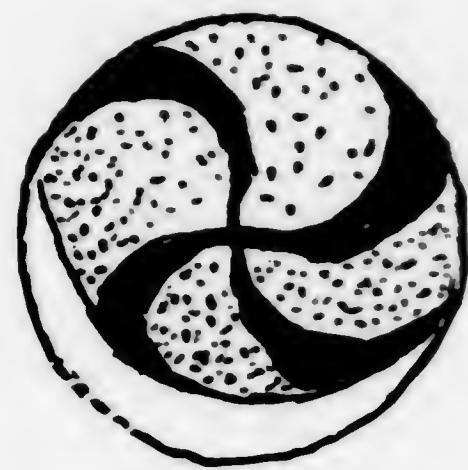
A school situated in the heart of pioneer America, where history and romance abound, where scenic splendor is unrivalled; you will be carried away from everyday routine to a new world, encompassed by the great open spaces. Here you will be filled with new energy, new understanding and valuable learning that you will cherish as long as you live.

You are no doubt planning a vacation next summer,—why not make it different? Whether you desire college credits or not, Seton Institute will provide you with an educational vacation so inspiring, so valuable, so unique, that you will cherish it as one of the high lights of your life.

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Retake of Preceding Frame





Retake of Preceding Frame



Navajo Silversmith

linguistic families of North America, at one time extending over parts of the continent from near the Arctic Coast far into the northwest of Mexico and from the Pacific to Hudson Bay and from the Rio Colorado to the mouth of the Rio Grande.

The local environment here reproduced reflects their living conditions as will be discovered by the visitor in northwestern New Mexico and Arizona where over 30,000 Navajos live today.

The Navajo country is most easily reached from Gallup, New Mexico.

HAVASUPAI

The beautiful home of this little band of 250 Indians is easily reached on the branch of the Santa Fe from Williams, Arizona, to the Grand Canyon, then by a few hours' journey from El Tovar.

Their village is situated romantically in Cataract Canyon, surrounded by crags, cliffs and mountains. There are beautiful falls of water over precipices of from 100 to 300 feet, and back of the falls are caves and grottos. The Havasupais have kindly traits of character and are very hospitable.

Women among the group here may be seen making baskets, but as their numbers are few, the art is fast disappearing, as, like other tribes aided by the government, they are becoming prosperous agriculturists.

The large adobe building (the front of which is a replica of an old Indian structure at Cochiti) near the entrance, is the salesroom where the products of the Indians of the Painted Desert are for sale under the direction of Fred Harvey.

PAINTED DESERT EXHIBIT



SAN DIEGO EXPOSITION



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Entrance to Painted Desert

THE PAINTED DESERT

THE Painted Desert is an exhibit of the conditions existing in the Spanish provinces of New Mexico and Arizona at the time of the coming of the Spaniards in the 16th century and which continue to the present day. Old cedar fences, feed troughs, poles, doors, hardware articles, farming implements, etc., that have been in use for a century or more in New Mexico Pueblos have been brought here.

Even the vegetation of the desert and the gnarled cedar from the hill-sides have been transported and planted so that the reproduction might approximate perfection in every detail.

In a corral, a herd of many-colored goats is being tended by an Indian who will use them shortly in threshing out his grain. Typical Indian sheep will furnish wool for the blanket weavers and meat for all. Indian ponies and burros complete the picture.

Great strings of red chili hang, drying in the sun; corn, to seed next year's crop, is suspended from poles about the houses.

Inside may be found Indian maidens grinding corn for their bread or preparing their meals; others are molding pottery or weaving baskets.

The rumble of drums to the accompaniment of Indian songs may be heard on certain occasions in the afternoon or evening.



Bathing



Acoma Potters

TAOS (Towse)

A reproduction of the great terraced houses of the Pueblo of Taos. This Pueblo was first visited by the Spaniards in the year 1540 and was known to them as Braba. As stated by the late Dr. Bandelier, America's greatest anthropologist, this Pueblo is the only village of New Mexico, ancient or modern, so far discovered, the situation of which corresponds with Castañeda's description and location.

Although the present buildings of Taos are not those of the Braba of the 16th century, they still preserve the appearance of the old village, and their position relative to the river and the valley is the same. Taos is, therefore, together with Acoma and some of the Hopi villages, one of the best preserved examples of antiquity so far as architecture is concerned.



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Navajo Weaver

the city in the sky. It is located about 60 miles from the Rio Grande in Valencia county, New Mexico. The Indian name is A-ko-me (People of the white rock). It was discovered by Francisco Vasquez de Coronado in the 16th century, at which time the population was about fifteen hundred. The people are industrious farmers, and are famed as expert potters.

Acoma may be most conveniently reached from Acomita, New Mexico, by a twelve-mile overland journey.

HOPÍ

The word Hopi is contracted from Hopi-tu, meaning peaceful ones. These Indians speak a Shoshonien dialect and occupy six pueblos on a reservation in Northwestern Arizona. They are popularly known by the name of Moki.

Bandelier says that the Hopi country is the province of Tusayan and is the Totontec of Friar Marcos. These people were first visited by Pedro de Tovar under orders from Coronado in 1540. About the year 1700, Hano was established on the east mesa near Walpi by Tewas from New Mexico. The Tewas were invited by the Hopis and have lived and intermarried with them although they have retained their native speech and many of their customs. The Tewas are expert potters, while the women from the other mesas, when not occupied with household duties, may be seen making baskets. Some of the men weave blankets and ceremonial sashes.



Santo Domingo Estufas

The Hopi villages may be reached from Gallup, Holbrook, or Winslow by an overland trip over what is known as "THE PAINTED DESERT."

SANTO DOMINGO ESTUFAS

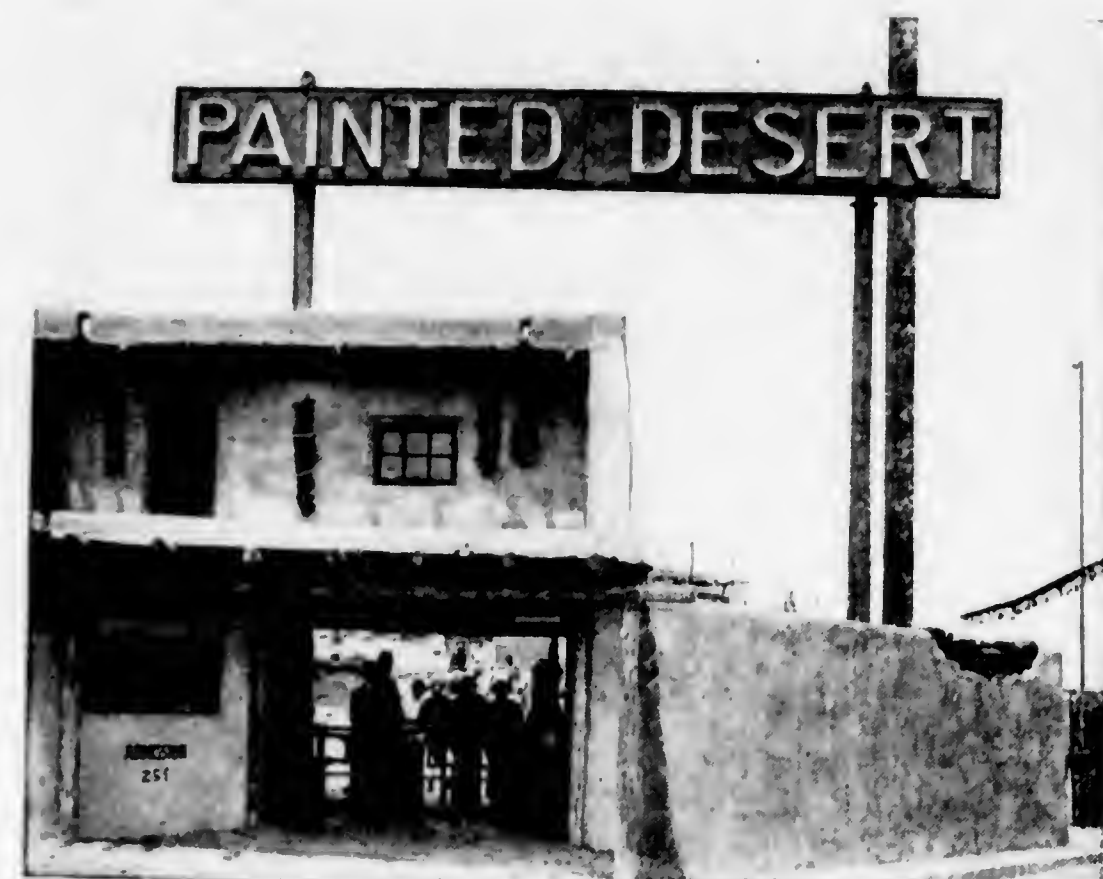
The large circular chamber or estufa is built above ground and is an exact reproduction, full size, of the council chamber at Santa Domingo, New Mexico.

The Tewas of Santo Domingo have adhered, with more tenacity than any other of the Pueblo tribes, to their ancient

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Retake of Preceding Frame

PAINTED DESERT



PAINTED DESERT

THE PAINTED DESERT

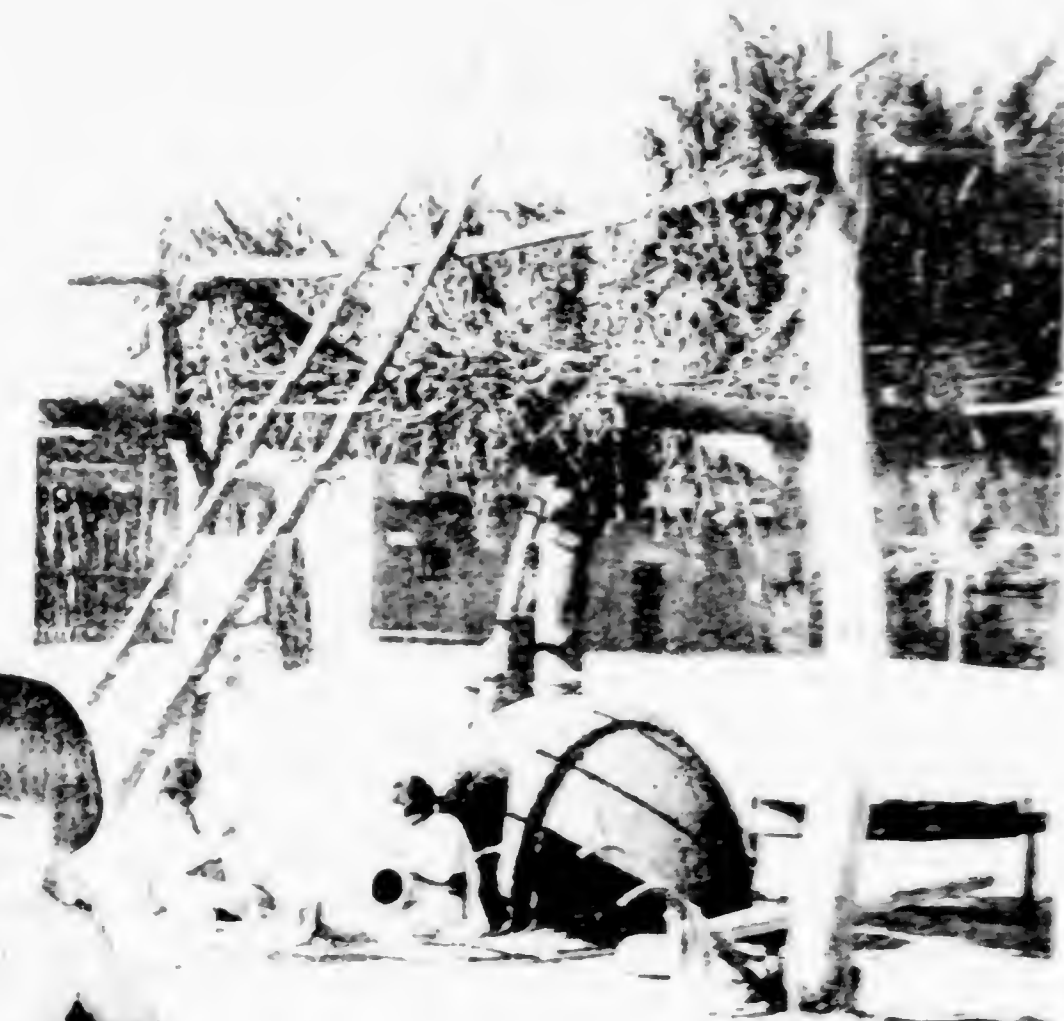
THE PAINTED DESERT is an extensive region extending from the Spanish province of New Mexico and Arizona, into the southwestern corner of the Spanish territory and a large corner of the United States. It is a region of great natural beauty, and is one of the most interesting and picturesque regions in the world.

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Boat



Pueblo Village

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Primitive residence and two women making pottery

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Native Man

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Retake of Preceding Frame



Indian Trading Post

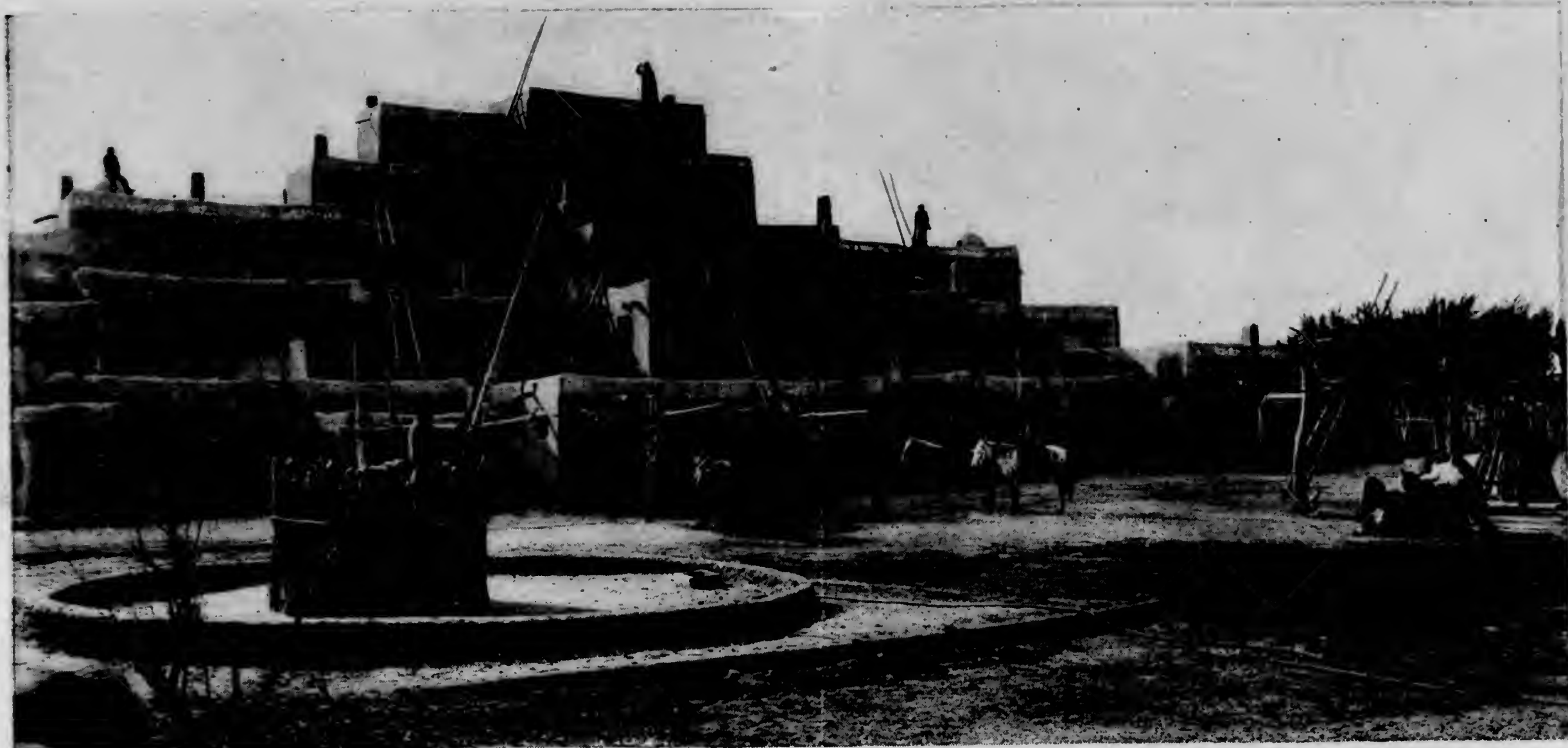
TRADING POST

The establishment of the great highway of commerce, the forerunner of the construction of the Transcontinental railways, was the Santa Fe Trail. Over this old highway, the pioneers of the Mississippi Valley held communication with the inhabitants of the internal provinces of the north, and they, in turn, carried on commercial relations by the frontiersman with various Indian tribes.

A typical frontier trading post of the early days, and as maintained today in certain localities, may be seen. Here may be witnessed the bargaining and selling conducted by the Indians and the traders exactly as these commercial transactions were performed during the past two centuries, and as may yet be witnessed among the Navajos and other tribes of New Mexico and Arizona.

APACHE

In the early history of the Southwest, Spanish conquistadors and Anglo-Americans had to deal with an aboriginal race more cruel and warlike than any of the Indians peopling the Atlantic seaboard—the Apache. During more than two centuries this Arab of the desert was the foe of pioneers and the scourge of the settler. During the days of Spanish occupation the authorities endeavored to subdue the Apache by alliances with



Taos, with Underground Estufa

the Commanche of the plains of Texas and Eastern New Mexico, and it was only through this arrangement that the Spanish occupation could be continued. With the opening of commerce on the Santa Fe Trail and the American occupation subsequent to the Mexican war, the American government expended vast sums in the final eradication of the Apache in the maintenance of its army and military posts in the Southwest. There were twenty tribes of Apache Indians who roamed at will throughout the Southwest and who derived their particular names from special localities.

A reproduction of an Apache rancheria or camp occupied by Apaches from Camp Verde, now a peaceful and industrial people. These Indians are especially noted as expert basket makers and today may be visited by a short overland trip from various points on the Santa Fe, Prescott & Phoenix railroad south of Ash Fork, Arizona.

CLIFF DWELLERS

In a large cave in the cliff, the last vestiges of a Cliff Dwelling remain, a mute reminder of a people who have disappeared, leaving nothing but their houses and their artifacts.

It is supposed that the ancestor of the Pueblo Indian of today was the ancient dweller of the cliffs and cliff houses which may be seen in northwestern New Mexico and northeastern Arizona. The most important of these groups of cliff dwellings may be reached by automobile from Santa Fe, the capital of New Mexico, and the grand ruins of Canyon de Chelly and Chaco Canyon can be reached by a side trip from Gallup, New Mexico.

NAVAJOS

Passing between the Cliff and the Butte and crossing a small stream fed by a spring at the base of a rock, we visit numerous conical structures covered with dirt, the "Hogans" of the Navajos. They collected the native material for their houses on the reservation in Arizona, and followed to San Diego to construct them.

Inside, the women are sorting, carding, spinning and sizing their native wool; others are weaving symbolic patterns into beautiful Navajo blankets. The men are making silver ornaments out of Spanish coins by the most primitive methods.

The Apache and the Navaio are of the Athapaskan race, the most widely distributed of all the Indian



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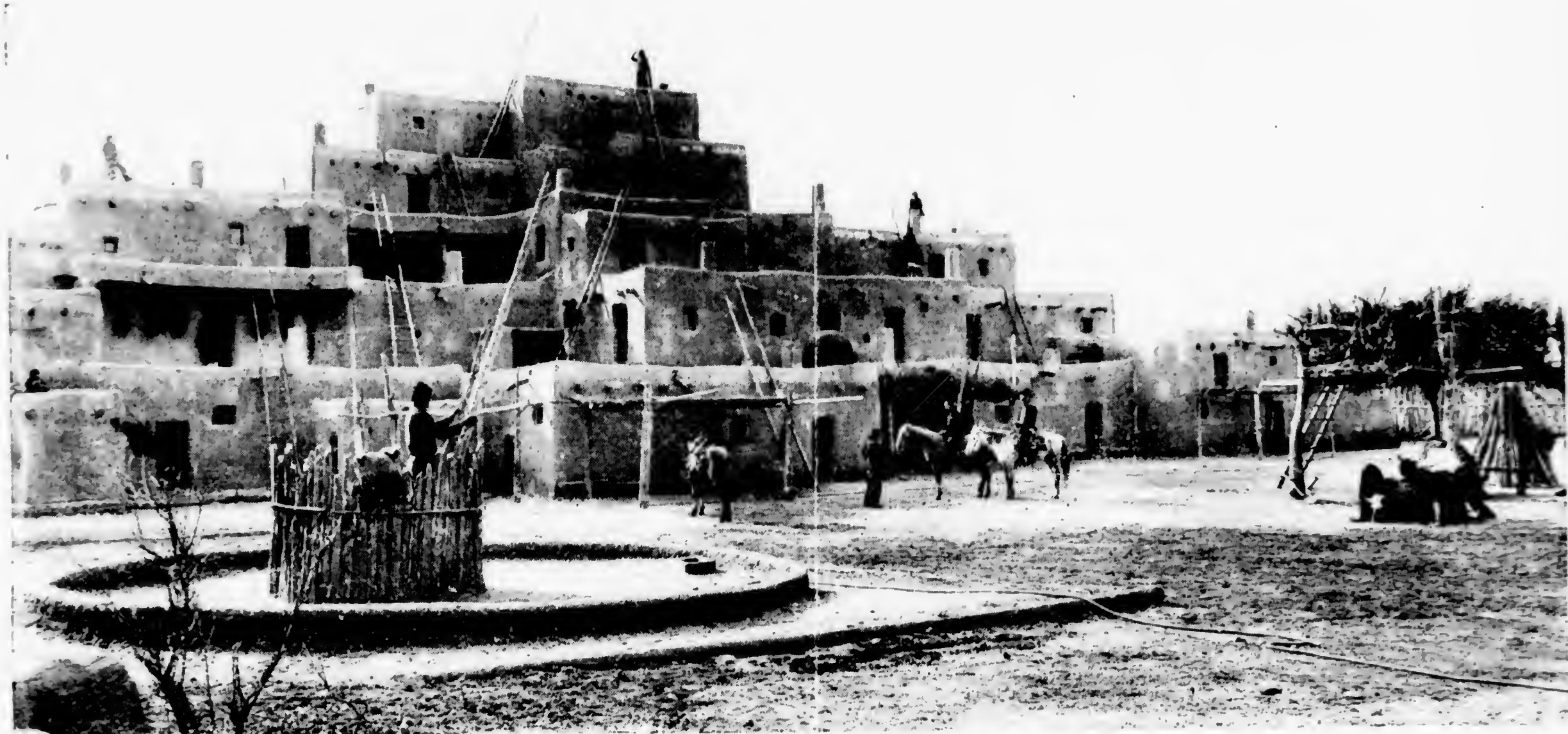
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Inside, the women are sorting, carding, spinning and sizing their native wool; others are weaving symbolic patterns into beautiful Navajo blankets. The men are making silver ornaments out of Spanish coins by the most primitive methods.

The Apache and the Navajo are of the Athapascan race, the most widely distributed of all the Indian

Retake of Preceding Frame

Oct. 1932

BLACK MESA PHANTOMS

FEARED BY THE INDIANS AND UNKNOWN TO WHITES, BLACK MESA
MAY EVENTUALLY PROVE ONE OF THE SOUTHWEST'S
RICHEST PREHISTORIC TREASURE SITES

By Philip Johnston

PHOTOS BY THE AUTHOR

THE Forbidden City of Lhasa and the leagues of unexplored land of central Arabia, zealously guarded by fanatical tribesmen have a mild prototype in our own Southwest. It is a large monoclinical table land, roughly triangular in form, embracing some 900 square miles of area; a stretch of little known land carved into arroyos and gorges by the same forces that excavated the Grand Canyon and chiseled the statuary of Bryce Canyon; a stronghold of an erstwhile warlike tribe of Indians who resented the outlander's intrusion with arrows and bullets; a "white spot" on the map of Arizona labeled "Black Mesa" by cartographers, called "Black Mountain" by local residents, and euphoniously named "*Zilh-a-djin*" by the Navajos.

When Kit Carson effected the capture of the Navajos, America's Bedouins, in 1863, his forces clambered to the summit of Black Mesa, rounded up a few women, children and elderly men, and passed up a number of agile warriors who escaped to the fastness of the gorges. Five years later, the Navajos were released at Fort Sumner, New Mexico, to resume life in their ancestral homes. They returned to live at peace with "*Washindon*"; but Black Mesa, traditional stronghold against Ute foray and Mexican invasion, continued to bear a sinister reputation. One John Walker, a prospector, was killed in the late '70s on a trail that led to the summit. Others who sought to learn its secrets dropped from sight mysteriously.

Even within recent years, Black Mesa, by reason of its rugged

contours, has provided sanctuary for Indians who have run afoul of *Pelekana* law. In 1900, a desperate battle took place between a hunting party of Navajos and a posse of white men sent out to arrest one of their number. The scene of this conflict was on the rim of Canyon Padre, far to the south, and its casualties numbered several killed and wounded on both sides. The leader of the Indians, a patrician chief by the name of Begwo Ettin, was gravely wounded. Upon the advice of a white friend that a long sojourn in jail would mean death, he asked his tribesmen to carry him to Black Mesa on a



From the rim of Black Mesa, fringing both the Navajo and Hopi Indian reservations in Northern Arizona, a wild and rugged panorama stretches



Kee-tsehi, the author's guide, surveys the upland fastness which yielded so much of scenic and prehistoric interest

blanket slung between two horses. Before his departure, he gave his word of honor that he would appear at the county seat for trial at the appointed time. True to his promise, he surrendered four months later, and won complete vindication.

Some years later, the utter futility of attempting to capture an Indian hiding within the fastness of Black Mesa was demonstrated to the discomfiture of an agent. Bila Shizhahi, chief of the northern Navajo, had never become reconciled to the new order since his return from Fort Sumner. To him the American was a traditional enemy, and members of his tribe who were too friendly with the *Pelekana* he regarded with strong disapproval. It was such an animosity that flared between the chief and one Tuchene Teel, and the latter was pummeled severely with a prehistoric stone axe. Thereupon the agent marshalled his police and set out to apprehend the assaulter; but he failed to reckon with natural barriers and Navajo silence to interrogation. After

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E · D · I · T · O · R · I · A · L

TOURING TOPICS

OCTOBER, MCMXXXII

EASING THE ROAD TAX BURDEN

THE proposal of the Automobile Club of Southern California and the California State Automobile Association to lighten the road tax burden by having the State take over additional county and city highways is being hailed throughout California as a wise move fully in keeping with prevailing conditions and well calculated to reduce city and county tax bills. The plan is considered to be particularly advantageous in as much as the efficiency of the present State system of highways would not be impaired nor would the general program of developing highways be endangered as the greater spread of State road funds would involve only a slight diminution of construction and a slightly less intensive maintenance program.

The proposal, which has the endorsement and support of Senator Breed, will be submitted to the next session of the California Legislature in the form of amendments to the Breed Allocation Act. It is recommended that 6624 miles of county roads be added to the State's system, that the State also take over additional through routes in city and allocate more money for their maintenance and improvement.

The plan has the added merit of not interfering with time-tried and accepted principles of highway construction and financing. It has long since been determined in this State that those who use the roads and wear them out should pay for their maintenance and this has been accomplished by means of a gasoline tax. It also has been established in the minds of all fair-minded people that no money derived from the motorists in the form of a gasoline tax should be diverted or used for any other purpose than that of road repair and improvement.

The present method of handling highway finances under the Breed Allocation Act has proved its worth under the test of actual experience and it is no reflection on the plan in operation that a modification and extension of its provisions should now seem advisable. The new proposal, in fact, seeks

not to displace the intent of the Breed Allocation Act, but rather to improve it to fit more accurately new economic conditions which have arisen.

In explaining the advantages of the new plan Senator Breed says: "The State Highway system would be expanded to include the addition of 3724 miles of county highways in the southern part of the State and 2900 miles in the north. The roads would be added to the secondary system and would place the north and south on an equality of total mileage of State secondary highways. It is intended that the roads taken over by the State should consist of the main inter-county highways which are now the cause of a great part of the road tax burden in the counties. Selection of the roads would be on the basis of a scientific traffic survey. A distribution of the added State highway mileage would be made over the entire State so that each section would derive some of the benefits. This would relieve the counties of the cost of improving and maintaining some of their more important roads and permit a substantial reduction in county taxes on real estate. The plan should, in many instances, permit total abolition of the present 40-cent road tax."

The proposal promises to receive favorable consideration when it is presented to the Legislature and is another interesting step in the evolution of California's highway policies. When the State began the task of financing and building a system of highways it had little in the way of precedent and experience upon which to base its plans. Early construction methods proved to be inadequate to meet the stress of constantly increasing traffic. These were changed to provide wider, safer and more durable roads. The distribution of cost has also engaged the attention of highway engineers and economists until the present sound policies were arrived at. Now California has taken the lead among the States of the nation with its superb road system and looks to future highway development with confidence.



To its prehistoric inhabitants, this cliff village must have been a veritable Gibraltar where enemy onslaughts could be easily withstood

ten days of wandering and futile search, he stamped from his riding boots the tenacious dust of Black Mesa and decided to let well enough alone.

It was in the autumn of 1919 that I had my first glimpse of this alluring country. That short sojourn of two days whetted a desire to see more of Black Mesa. What secrets were locked within its deep chasms? Thirteen years of speculation on this subject lent great significance to a minor news item: an automobile road had been built to the summit! The occasion for its construction was the discovery of large veins of coal which was needed for fuel at the reservation schools operated by the government. And so it was, that, upon a certain June day, I found myself headed northward from Flagstaff, accompanied by my life mentor.

Through a stately forest of pine the road twisted its way to the summit of a divide and then plunged into a juniper-clad valley, ringed with dead volcanos. Another transition to Jurassic sandstone, bright red in color, and the Cameron bridge lay just ahead. Here an enterprising trader, Hubert Richardson, has built an attractive resort overlooking the canyon. Alluring, too, is a large swimming pool, picturesquely located in the rocks, where one may spend a delightfully cool hour under the blazing stars.

Here we entered the mysterious border of that enchanted land known as the Painted Desert.

From the point where the Tuba road debouched from U. S. Highway 89, a gorgeous panorama unfolded its dazzling array of form and color. First was the eroded cliffs enclosing Moenkopi Valley, red as an Arizona sunset; then came the primitive Hopi village of Moenkopi, surrounded by its green orchards and corn fields; beyond the pueblo, rose the poplar and cottonwood guardians of the Tuba school campus, where serried ranks of arboreal giants cast a pleasant shade.

The next fifty miles was a potent object lesson on sand. Compacted by mighty forces in eons past, it rose in the sheer

cliffs of White Mesa, which resembled the battlements of a great city wall; borne by the gale in a stinging barrage, it scoured the face of those cliffs, cutting them into fantastic shapes that found a climax in the White Mesa Natural Bridge; drifting around yucca, greasewood, and "Mormon tea", it forced those vegetal desert denizens to push their shoots farther skyward or succumb. In great rippled dunes it lay, silent and inert, but potentially destructive, awaiting the wind to set it in motion. Throughout the world, scientists aver, sand is constantly advancing upon arable lands, transforming them to wastes.

It was upon the side of a small valley, below a large dune, that the colorful trading post at Red Lake ap-

The large cliff ruin discovered on Black Mesa comprises approximately 100 rooms, built upon a narrow shelf in a deep and almost impregnable gorge



peared. With ponderous walls of stone, the building had the appearance of a fort, built for defense against hostile tribesmen; but once within those walls, a delightful interlude of cool temperature demonstrated the reason for such construction. The rays of a desert sun have searching qualities, yet the air is dry and shade is always comfortable.

At Bekashebito a pleasant surprise awaited us. A new road, we learned, had been built through Shonto, avoiding those spacious adobe lowlands known as "Calamity Flats." Passable, though frequently rough in the dry season, the stretch of road through them is one of Arizona's worst when they are saturated by rains.

When the Great Architect laid out the plans for Northern Arizona, He must have reserved for Shonto a unique part. Abysmal, colossal, remote from human contact, and designed to be viewed with awe were Monument Valley and the Canyon of the Colorado; but Shonto was made a perfect stage upon which

SKY-HOMES OF THE ANCIENTS

THE Colorado Basin is littered with the ruins of cliff dwellings of prehistoric peoples. Canyons tributary to the San Juan, the Gila, the Virgin, and the Colorado contain them in vast numbers. Frequently they're small—two, three or four rooms. Frequently, too, they're inferior in design and construction. Therefore when venturesome Explorer Johnston discovered the cliff ruins he tells about here, high on Black Mesa, he made a real discovery. One ruin, he reports, has an hundred rooms. In size, thereby, it ranks with famed Betatakin. No white has ever before described this eerie sky-home of the ancients. John Wetherill, veteran guide of Kayenta, knew of it, but never had seen it; and Wilfred Vincent Kidder, renowned ethnologist who has described many sites in the area, has failed to note this one.

Johnston left what he found intact; didn't even scratch his initials on a wall to record his visit, thus leaving to trained and competent archeologists a virgin field for exploration.

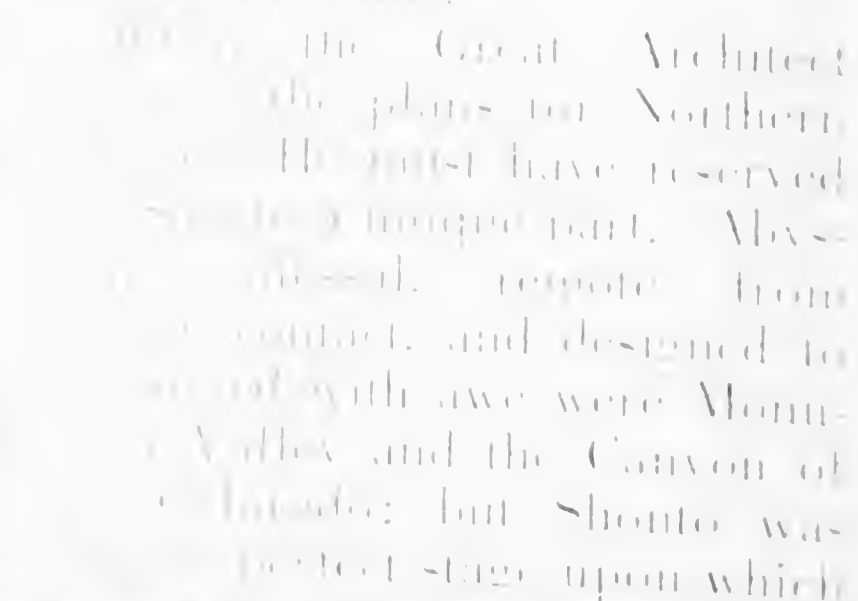
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Five hundred feet to the southeast stands a trading post—a squat stone building that blends, chameleon-like, into the cliff behind. A number of saddle ponies stand to rein, patiently awaiting the return of the riders. Within the store is the ebb and flow of reservation barter. Red men with big hats lounge against the counter, blanketed women examine calico with critical eyes, and crated infants blink helplessly as hungry flies scurry across their faces.

Shonto . . . "Sunlight on the Water" . . . gathering place of the Clans! Tour the Navajo country, if you will, to glimpse the colorful pattern of native life—but stand here as a spectator, and it will pass in review before you.

Five or six hundred years before Columbus sighted the New World shores, there dwelt in this land a strange race. Who they were and whence they came is conjectural; but they left behind a number of mysterious ruins which have been the cause of much speculation among the archeologists. Then as now, Shonto was an important watering place.

Upon the adjacent uplands villages were established, and in Segi Canyon, to the east other sites for villages were selected. Of the latter, Keet Seel and Betatakin have been acclaimed the largest and best preserved ruins in Arizona. Until recently, the latter was accessible only by horseback from the mouth of the canyon, a distance of some eight miles. From the new highway, four miles east of Shonto, a car may now be driven six miles over a dim road

to within four miles of Betatakin. The remaining four miles, which includes a steep climb down a cliff dwellers' trail may be negotiated by an experienced hiker; while a jaunt less fatiguing may be arranged by securing horses for the last lap.

We left Shonto reluctantly. The road climbed to the canyon's rim by an easy, uniform grade, and led over the plateau to the edge of Long House Valley, dotted with Navajo corn fields. Upon a small promontory a mile to the north rose the masonry walls of the structure from which the valley received its name. It is a large pre-pueblo ruin, contemporary, perhaps, with Betatakin. Local tradition assigns it the role of fortress during the campaign of Kit Carson, when the latter was said to have made its thick walls an insurance against surprise attacks.

Along the southern horizon, Black Mesa, our objective, reared its prodigious bulk like some great Brobdignagian city, impregnable against assault. As far as the eye could see, to the east and the west, that barrier extended, seemingly bisecting the whole realm into two distinct and diverse parts. Before us the magnitude of that vast tableland was graphically



Shonto is a gathering place of the clans, where the multicolored procession passes in review before the spectators

apparent; but recourse to the map revealed its full dimensions. Starting southwest of Bekabishito, about thirty miles to the right, it gradually rose to its apex at Lolomai Point, due south of Kayenta, veered to the southeast and continued past Chilchinbeto and Rough Rock to Yale Point which the map credited with an altitude of 8050 feet. This total distance of some seventy miles formed the northern boundary of a region shaped roughly like a broad spear-head pointed toward the Utah line. Within it was a space devoid of roads extending from Red Lake on the west to Chin Lee on the east, and from Kayenta on the north to Zillesa Mesa on the south. Topography, settlements, and other notations were conspicuous by their absence. In short, Black Mesa was the largest tract of unexplored land in Arizona, and one of the largest in the United States.

A tenuous white line appeared along the side of the mesa, rising from the base to the summit at an angle of about ten degrees. It was the new government road to a coal deposit a few miles beyond the rim. Five miles west of the junction of the Shonto road with the old Kayenta road, this new thoroughfare debouched and headed straight for the side of the promontory. In a short time we were climbing a uniform 18 per cent grade where the road had been blasted from the solid stone. Without difficulty the summit was reached, and below a great panorama stretched away to infinity. To the northeast we looked down upon the red gash of Segi Canyon, while the northern horizon was dominated by the nebulous dome of Navajo Mountain, hazy-blue in the distance. The intervening

space was dotted and splotched with areas of scrub forest, bare plots, and seamed with canyons.

And now the new road led away from the rim through a thick piñon forest, close-packed and secretive: familiar landmarks disappeared behind us as we headed toward the Unknown. First there was a short, level stretch, then a long, gentle grade as we descended to the floor of a wide valley where the stunted forest still grew. On the edge of a small ravine we descried the loading platform of the coal mine, and a black spot above it marked the entrance to the tunnel. Recalling directions given me at Tuba, I turned right, following a dim wagon track made by Navajos hauling water to their camps. Two miles distant, I had been told, was a temporary stopping place of Jahnez Holone Begay, (son of the man who owns mules), who could give desired information.

Winding through sage and juniper for a mile, the tracks finally plunged into a large wash, which, I subsequently learned, emptied into Blue Canyon. It was a tortuous watercourse, snaking its way between high "cut banks" and detouring numerous sand bars. The bed for the most part was dry but here and there a tiny stream oozed to the surface, trickled for a short distance over compacted sand, only to disappear into the substrata whence it had come. We encountered no obstacles to motor travel until I learned to my sorrow that the hard sand was only a veneer. Through this crust the right rear wheel broke, plunging into a mass of soft clay, black as Erebus and slick as a Philadelphia politician. A brief examination showed that the slimy ooze offered no sound base for a jack, and

that suitable stones or timbers to build one were not available. Assistance was needed—and that most urgently!

Walking a mile farther up the wash, I finally located the object of our search—a shelter of canvas laid over poles and surrounded by junipers. A woman sat at a loom, weaving a blanket. A comely girl of sixteen summers twirled between her fingers a *bayatizi*, that crude top which spins the warp. Two small boys, of five and seven, sat upon a pile of sheepskins.

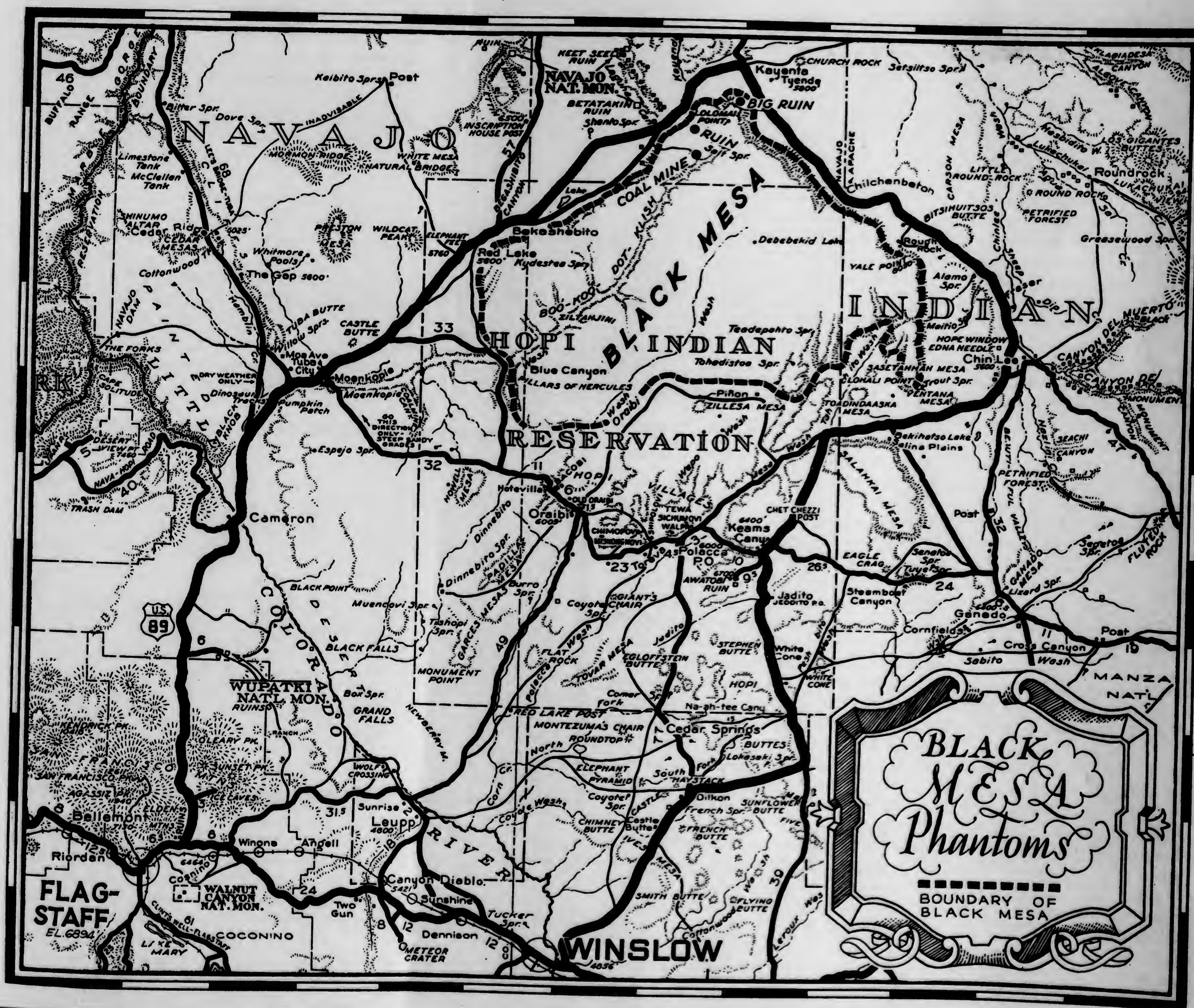
"*Heloni, shitazhi!*" (How are you, my little sister?) I said, extending my hand to the weaver.

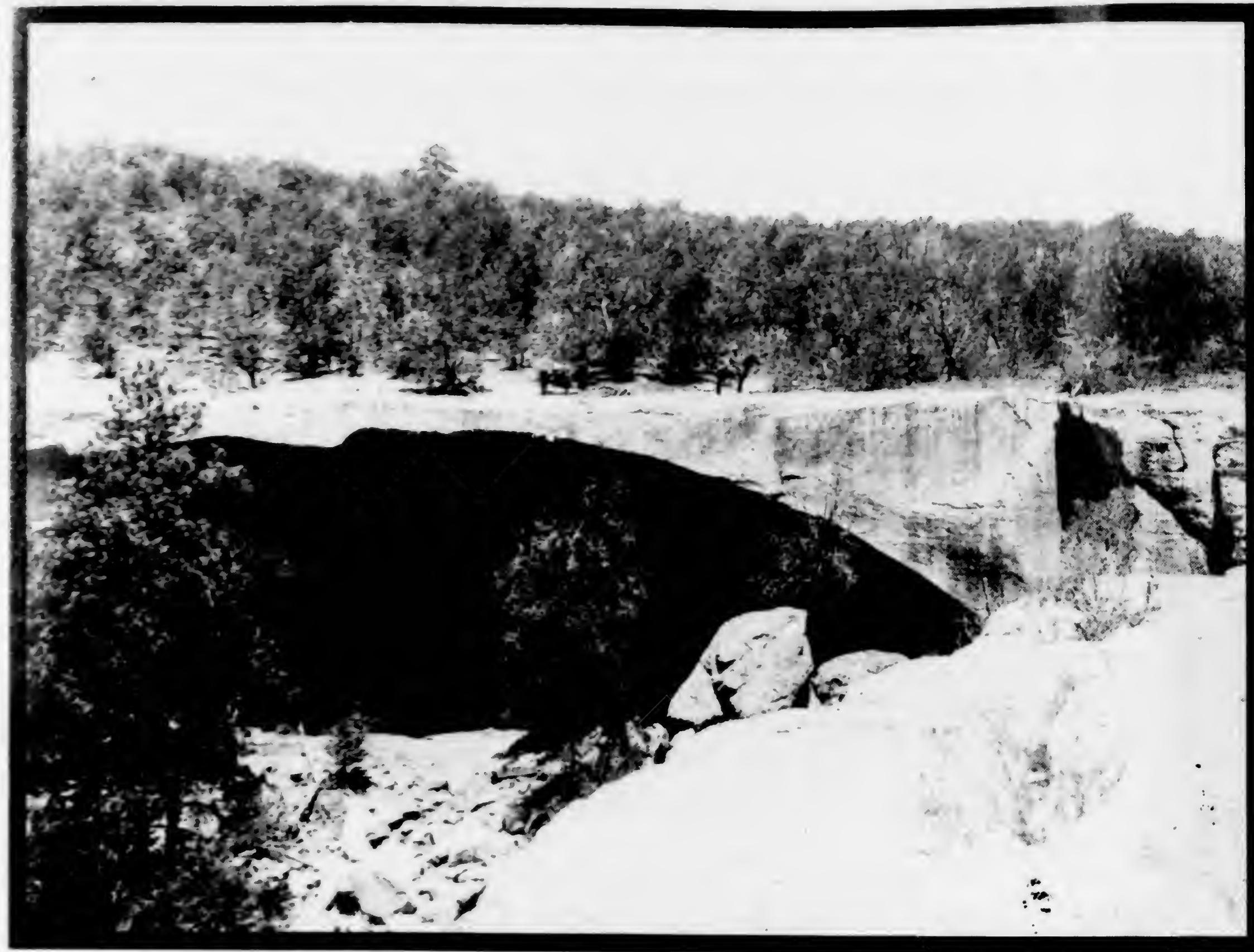
With a smile she returned the salutation. Then I shook hands all round, receiving in each case a smile of welcome. A large sheepskin was spread upon the ground for me. Comfortably seated, I began my story.

"I have come from my home far away, near the Wide Water, to see my people the Navajos. They have been very good to me; but their country is often unkind to a traveler. My *chiti* (automobile) is held prisoner by mud in that wash. *Shi estzon* (my wife) sits down there alone, wondering if we can free it. We must have help—or make our homes forever upon this mountain."

Turning to the girl, whose name I afterward learned was Shae, the mother said, "Get your horse, quick!"

There was grace in every move as Shae rose to her feet, picked up a bridle, and disappeared into the forest. Five minutes later she returned, riding bareback at a full gallop. Saddle blankets were laid upon the horse's back, and then a heavy stock saddle, raised by





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Walking a mile farther up the wash, I finally located the object of our search—a shelter of canvas laid over poles and surrounded by junipers. A woman sat at a loom, weaving a blanket. A comely girl of sixteen summers twirled between her fingers a *bayatizi*, that crude top which spins the warp. Two small boys, of five and seven, sat upon a pile of sheepskins.

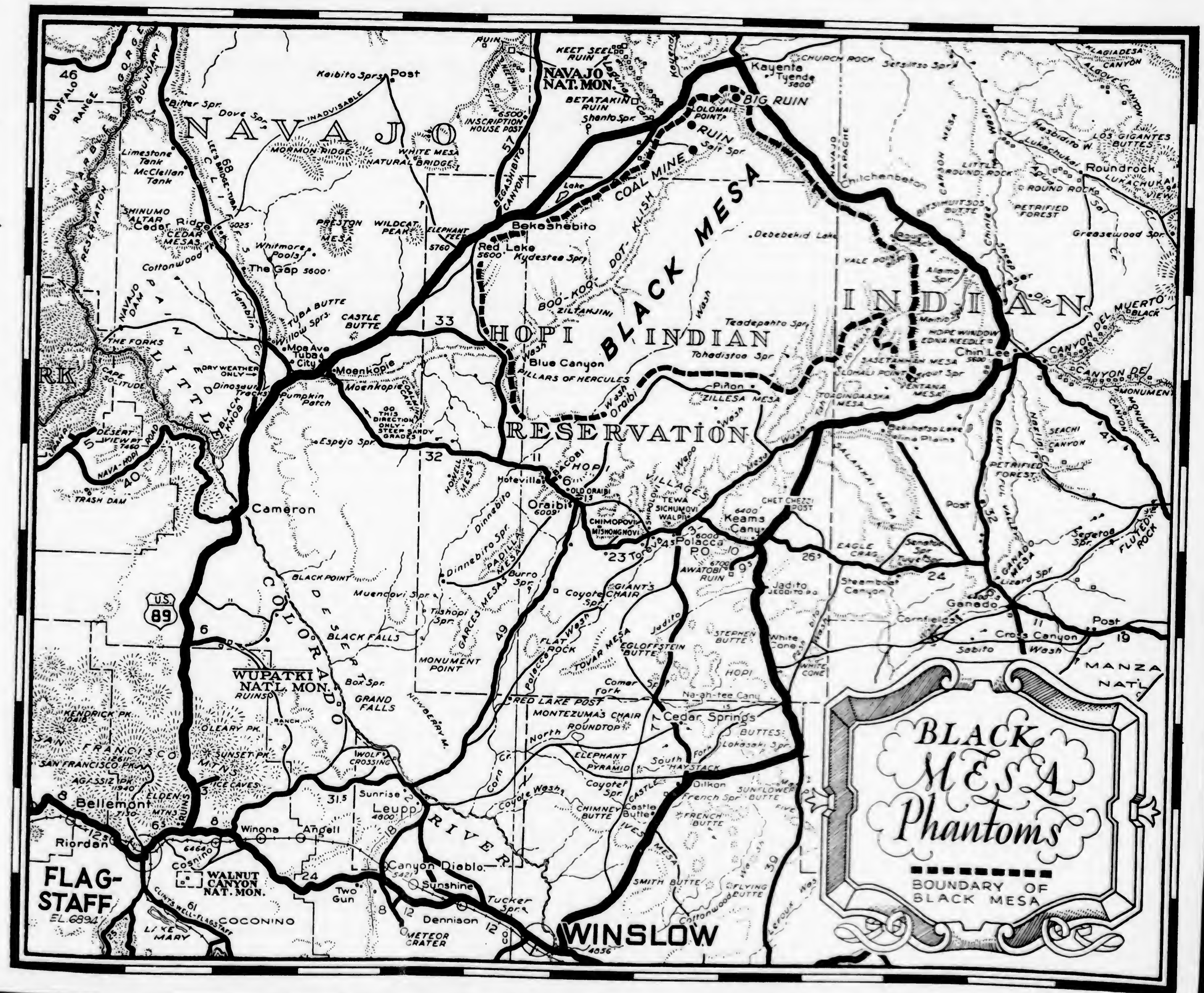
"*Heloni, shitashi!*" (How are you, my little sister?) I said, extending my hand to the weaver.

With a smile she returned the salutation. Then I shook hands all round, receiving in each case a smile of welcome. A large sheepskin was spread upon the ground for me. Comfortably seated, I began my story.

"I have come from my home far away, near the Wide Water, to see my people the Navajos. They have been very good to me; but their country is often unkind to a traveler. My *chiti* (automobile) is held prisoner by mud in that wash. *Shi estzon* (my wife) sits down there alone, wondering if we can free it. We must have help—or make our homes forever upon this mountain."

Turning to the girl, whose name I afterward learned was Shae, the mother said, "Get your horse, quick!"

There was grace in every move as Shae rose to her feet, picked up a bridle, and disappeared into the forest. Five minutes later she returned, riding bareback at a full gallop. Saddle blankets were laid upon the horse's back, and then a heavy stock saddle, raised by





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How delightfully cool was the deep shade under that rock of ages! Howling tempests, drenching rains, and a searing sun had been powerless to mar the comfort of the people who, ages ago, chose this site for their homes. Why had they left such a marvelous shelter? Was it because of attacks from hostile tribes, or a recurrence of that wanderlust which impelled their forbears to brave the icy perils of Bering Strait? To these questions the ghostly silence vouchsafed no answer. The gaping doors, barely large enough to admit a human body, seemed to mock us with the blank stare of black Cyclopean eyes.

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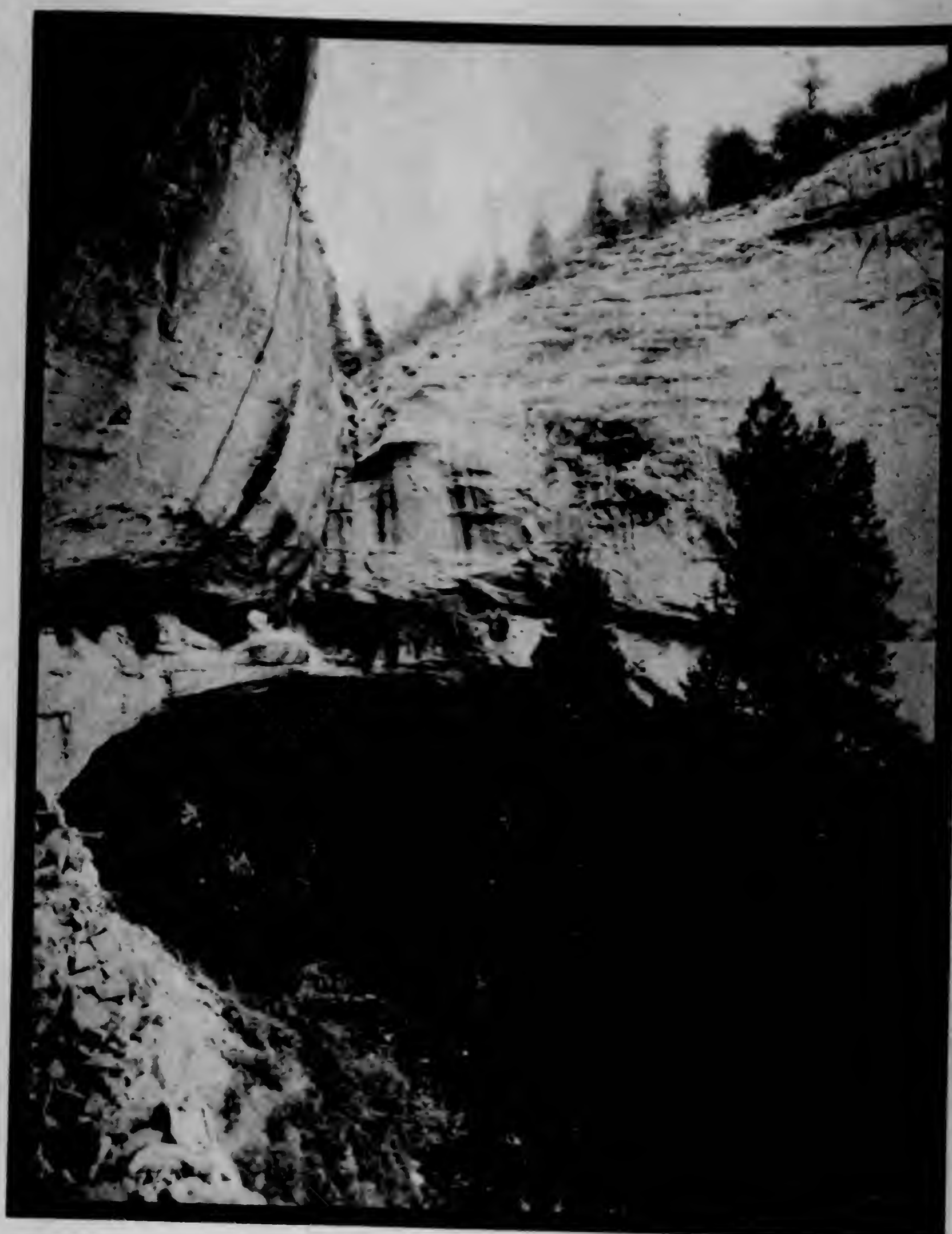
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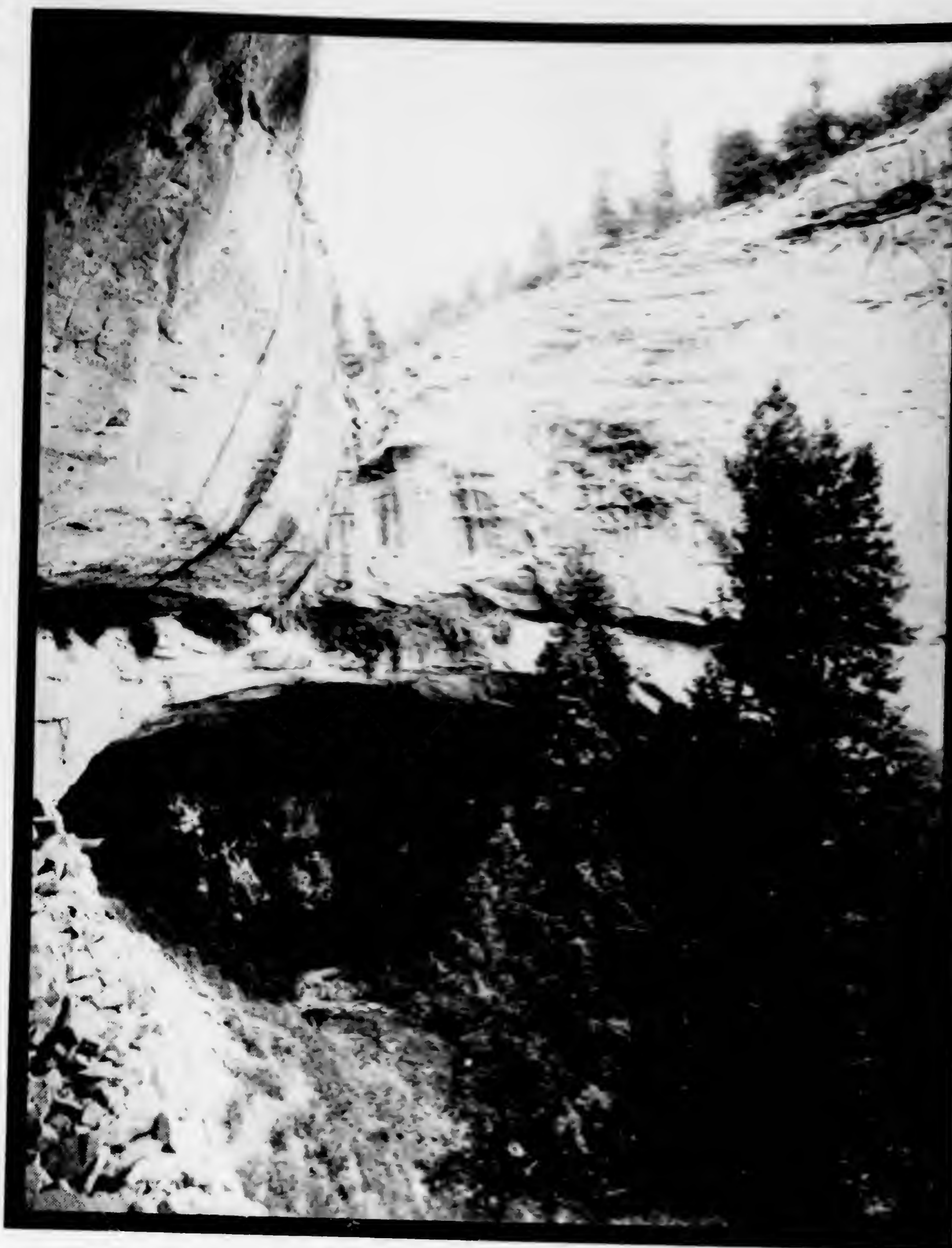
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(Continued on Page 42)

MBONGO AND NGAGI

---San Diego's Two Youthful Gorillas

By Belle J. Benchley

PHOTOGRAPHS BY LEWIS WAYNE WALKER

savage chieftain, suddenly placed in strange surroundings. They paid no attention either to the crowd of spectators, the cameras, or the great apes on either side of them. People in the crowd spoke of their unconcern and their poise. The chimpanzees screamed and spat water upon them when they approached that side of the cage. They stood unblinking and apparently unconscious of this contemptible attack. Slowly they walked around the four sides of the



Huge ropes that are hung from the ceiling of their cages are dear to the young gorillas for they are a reminder of the vines which hang from trees of the jungle they knew and loved so well



Ngagi feels a loose tooth to determine whether or not it really is coming out—a procedure common among children of men as well as among children of gorillas. Note the long coat of hair on this youngster!

cage as though to assure themselves that it was a proper home for them.

Their keeper, the first white man to care for them, approached with fruit, for it was just at noon. They walked directly to him, accepted the bananas and oranges, sat down upon a low concrete block and ate with excellent appetites. Apples they scorned, for they were strange, perhaps forbidden fruit to them. After eating, they walked toward each other, gazing earnestly rather than anxiously into each other's eyes. Then one sat down and the other made

APES LIKE MEN

LARGEST of the anthropoid (man-like) apes, male gorillas often attain a weight of 400 pounds and a height of 5½ feet. Closely resembling man in the chemistry of their bodies and the structure of their brains, scientists like Wolfgang Köhler, professor of philosophy in the University of Berlin, who have studied apes assiduously, believe that their lack of speech is the chief obstacle that prevents them from attaining cultural development and thus becoming even more like men. First extensively described by the French explorer, Paul B. du Chaillu, in 1861, gorillas have become even better known to man through the investigations of Carl Akeley and Martin Johnson. California scientists may find in studying Mbongo and Ngagi the answer to many still puzzling questions about the apes that bear such a close resemblance to men.

PEG-LEG SMITH: HIS STORY

(Continued from Page 21)

fighter and horse-thief, and now was to take part in that last colorful, stirring episode of California history—the gold rush of '49. Having caught the gold fever with all the rest, his imagination was fired with the memory of the gold sprinkled rocks his partner had picked up years ago in their thirsty trek through the desert. He left his mountain camp, and again took the Spanish Trail to Los Angeles, returning in leisure where he had last left in haste.

He was stranded in Los Angeles with no money for stagecoach fare to San Francisco, but with sheer bravado obtained a free ride. When the driver asked him for his ticket, Peg-leg became infuriated and began to unbuckle his wooden leg for a fight. The driver tactfully made the best of the situation by refusing pay from a one-legged man, and an old one to boot.

In San Francisco, Smith was successful in organizing an expedition to seek for gold on the three buttes in the Colorado Desert. Fully equipped for a long trip the prospecting party left Los Angeles and started in a southeasterly direction for Smith Mountain, where the last water was to be found. Before they reached the spring, the Indians who had been brought along to tend to the pack mules quietly decamped in the night with all the provisions and equipment. Some Indian superstition held them from aiding white men to find the haunted treasure which they kept secret. The party was unable to reach Smith Mountain and was

forced to turn back or face a waterless death in the hot sands. Peg-leg's dream of wealth to be picked off the hillside was rudely broken, and much disheartened he returned to the settlements.

Many have sought the treasure that Peg-leg had so nearly in his grasp but never found again. Still others searched in vain and either lost their lives or lived to curse the rosy rumors that led them to untold suffering under the desert sun. Numerous accounts were circulated about the lost Peg-leg Mine, and they were never told twice alike. The tales grew into a golden legend of Indians and white men who had found the queer, black-coated nuggets like those picked up by Peg-leg's comrade; of the travels across the desert, of the spring at the base of Smith Mountain, and the three buttes rising up out of the sandy plain somewhere between Yuma and San Bernardino. Grizzled old prospectors, with imaginations made lurid by strong whiskey, have poured so many wild stories about the lost mine into the ears of gullible tenderfeet that the whole affair has come to be looked upon as a myth. Yet it is said that there are people still living in San Bernardino who knew Peg-leg Smith and saw the almost pure gold nuggets which were brought from the desert.

Smith's last days were spent in the vicinity of San Francisco when the gold-rush town had become a bustling young city. His friends in the country furnished him with the necessities of life, and when he had exhausted small town gossip he would go to the city and take up his stand at "The Old Corner." He would gladly accept a social glass from a curious, interested passer-by, and when his tongue was loosened would spin yarns of his "wild west" experiences. He died in the County Hospital in 1866, to all appearances a broken-down old soak. But beneath the worn exterior was the heart of a man who had lived the fullness of life in the wildest, freest, and most exciting days of the far western frontier.

MBONGO AND NGAGI

(Continued from Page 17)

live entirely upon fruit and vegetables with milk and sometimes eggs. Mbongo loves castor oil, but Ngagi has to have hers disguised in some palatable food. They seem devoted to each other and while they never commune in words, most people who watch them, seem to discover some sort of understanding in the gestures or looks which pass between them at rare intervals. Ngagi has but to reach out her hand and touch Mbongo's shoulder and he leaves whatever he has been doing as though he had been spoken to.

They are not afraid, for they seem to have an inherited knowledge that they are masters of any situation, yet they have shown a great reluctance to allow themselves to be touched. Ngagi is especially suspicious of the advantages of captivity. She lacks the frank, open friendly nature and appearance of Mbongo, yet all of us who work with her know that when she does make up her mind to accept us as her friends, she will be the more dependable and trustworthy of the two. She is accepting people one by one, but each new association is brought about by an almost pitiable

she felt my first touch, heavy beads of perspiration broke out all over her black face. She did not draw away and soon relaxed with a deep sigh against the bars and never since that time did she allow an opportunity to pass without receiving her petting, even though for a few days it was evident that she was forcing herself to accept the attention.

After ten months in their new home, which was built to contain everything for the comfort of a gorilla, they seem to have accustomed themselves most happily to their new life. They swing on the great ropes suspended from the ceiling of their eighteen-foot cage; they lie in the crotch of one of California live-oak trees; they wade in their large pool and drink from the trickling stream which connects it with their drinking fountain; they run races around the fallen logs and stumps on the floor of their cage, making the deep circles which every one speaks about that has seen them in their native haunts. They are truly happy; all of the longing has gone from their eyes. They no longer sit on the topmost branches of their tree trunk and gaze with a morose expression far into the eastern sky, though they climb up and watch for half an hour before feeding time for their keeper to open the gate and bring them their meals. They know their own dishes and when they see them coming, they swing down the ropes and start for the door of their cage to meet him when he arrives. So quickly have they adapted their ways to captivity that you can scarcely believe that only a few months ago, they were living in the deepest jungles of the Alumbongo mountains. Yet when a flock of pigeons suddenly flies over their cage with a whirr of wings, or a peacock screams, they both start and look up, no matter what they are doing. For there still remains in their jungle-bred minds the knowledge that when birds are frightened, danger may be approaching for a gorilla. The growth of the gorillas since coming to San Diego has been rapid, both have gained about thirty pounds in weight. Under the circumstances, it would seem that they have an excellent chance to live and attain maturity. They have been out of doors every day for all day, they have never missed a meal, and they are happy. They have already answered many of

the questions scientists have been seeking to answer and within the next few years, the mystery of the gorilla will undoubtedly be greatly solved by the study of these two gorilla children. And it is always a joy to study them for they are the blackest, most intelligent, most responsive and most dignified, most playful and intriguing of all the zoo's 2500 inhabitants.

BLACK MESA PHANTOMS

(Continued from Page 15)

first time upon human beings invading their sanctuary.

Along a shelf jutting from the western wall, perhaps a hundred feet above us, we discerned that which proved to be the climax of our odyssey. It was a masonry wall, built up from the brink of that ledge, and extending for 200 or 300 feet. What lay behind was hidden from our eyes by the acute angle from which we viewed it. Searching for a route over which we might climb for a closer inspection, we picked our way up a steep, boulder-strewn slope, where no trails or other sign of human travel were to be seen. At last our progress was halted by a perpendicular cliff, the eroded face of which scowled down upon us as though to warn against further attempts to ascend. Lacking the ability of a small lizard that scurried up and out of our reach, we skirted the base in search of a passage. At last we found it—a series of tiny notches in the rock which were undoubtedly carved by hands. Erosion had smoothed them out to a great extent, but we were able to scale the cliff with little difficulty. And thus we entered the lost city of Black Mesa.

Imagine, if you can, the strange mixture of feeling with which we advanced to those stone walls—the first human beings to set foot in these dwellings since they were vacated, perhaps a thousand years ago! Amid the ghostly silence, accentuated here by the ruined homes of a departed people, we trod softly lest we disturb those wraiths which the Navajo still regards with mortal fear.

The site had been admirably chosen from a standpoint of defense. The canyon itself was isolated from the

HOW? WHAT? AND WHERE?

- (1) By what other and more familiar names is the tribe of Allequa Indians known? (See Page 24).
- (2) Where is Black Mesa located and for what has it recently become noted? (See Page 10).
- (3) What famous Western frontiersman gained a peculiar nickname through a self-performed surgical operation? (See Page 18).
- (4) What is the largest species of anthropoid or man-like ape? (See Page 16).
- (5) How can you ship your household furniture by rail without crating it? (See Page 47).
- (6) What does the astronomer mean when he refers to the "magnitude of a star"? (See Page 34).
- (7) How is a gila monster's bite rendered non-poisonous? (See Page 33).
- (8) What new proposal has been advanced by the Automobile Club of Southern California to improve road conditions and to lighten taxpayers' burden? (See Page 9).
- (9) Where can one view the skeletal remains of the prehistoric monsters found in the tar pits of Hancock Park on Wilshire Blvd.? (See Page 36).
- (10) What portion of the Pacific Coast, near Los Angeles, is slowly sinking into the sea, and which has already dropped more than six feet? (See Page 37).
- (11) In what manner does Long Beach propose to become a "Tax-less" city? (See Page 38).

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CONTRACT CAR CARE

(Continued from Page 32)

loose and the others are normal the motor is going to sound noisy and rough. This will be true even if none of the valves holds open or fails to lift high enough for efficiency. Most of the tappet annoyances can be traced to just one valve. Often mechanics will give all the tappets a little more clearance, actually increase the noise the motor makes and yet make the engine sound much more rhythmic than it would with just one tappet rapping.

Speaking of noise, have you ever had to send an "SOS" for a refrigerator service man when the kitchen resounded with the constant knocking of what seems to be a broken compressor? If so, and if you were around to hear the verdict, you may have picked up a valuable tip in your motoring. You learned that a belt can become so noisy as to sound exactly like a mechanical disturbance.

Quite frequently automobile owners are able to trace "motor knocks" to the fan belt. This is usually due to the knobs on the inside of the belt, but sometimes a plain belt will develop this trouble. Just why the belt should make this noise isn't always plain. We do know from experience that replacing it ends the trouble and makes peace in the family.

If you want to roll up a good score know your rules and apply them. You can score in numerous ways by aiming for just that very thing. Just by way of illustration let's deal a hand and see what we can do toward winning a few happier hours at the wheel. We were talking about wheel wobble at the start of this meeting, so let's open the bidding with a few words about front wheels.

Did you know that a loose front wheel can be one of those causes of shimmy and other troublesome steering eccentricities? Wheels often are loose because they are not tightened according to rules. It is not enough to push a wheel in on its axle. Draw up the nut tightly until the wheel cramps, then back off the nut slowly until the wheel spins freely. Right at this point is something that would interest a Culbertson, Lenz or Work.

I can explain it best by telling what happened to John Blank who got this far with his wheel work only to go astray. When he found that after backing off the nut a little the wheel still cramped he figured he had forced it in too far. After removing it he replaced it without drawing up the nut tightly. The result was that the wheel was much too loose, the car went into a shimmy and Blank is blank.

The truth of the matter was the final cramping of the wheel had nothing to do with its tightness on the axle. The brakes were dragging. After he completed his part of the work he had the brakes adjusted. That eliminated the drag. The wheel was then free to wobble to its heart's content. And it did.

Whenever removing a front wheel it is important to clean the bearings and the brake drum. Then the bearings should be repacked with fresh lubricant. The trend today is toward a type of stringy grease usually used for universal joints. The grease stays put and has much less tendency to work through into the brakes. Always replace the felt washer or re-

do so forces grease into the brakes. Greasy brakes grab. It requires but one unexpected grabbing of the brakes to throw the car into a bad skid or an actual upset.

The rules of the game are constantly changing. What I have just said about packing grease into the hub caps would have been useless advice before the days of front wheel brakes. I've just been checking over some of the earlier advice to car owners and find a number of warnings to the effect that when installing new spark plugs it is important to adjust the points. Today on a chart just issued by one of the leading plug makers is this interesting notice: "The gaps on the new Blank plugs are correctly set with precision and must not be altered."

There's an odd one for you, and yet it is logical. We used to buy a standardized plug and then set the gap to match the characteristics of the engine. Today we select the type of plug designed for a particular motor and are bidding wild if we undertake to alter the gap. Incidentally a good rule for resetting used spark plugs is to have the gap not less than .025 inch or greater than .030 inch for all types of motors except Ford cars and trucks where the gap should be not less than .030 inch or greater than .035 inch. This is the advice given by one of the leading plug manufacturers. It conflicts with some of the current popular ideas on the subject, but fits in with the theory held by many old timers, including racers, that there are definite advantages in wider spacing of plugs.

Many owners have found that too wide a spacing, usually due to wear on the plugs, has caused backfiring on hills. They do not realize that the real trouble probably lies with the weakness of the ignition system, largely due to the coil. With efficient ignition a wider gap is permissible at the plugs. This makes for a bigger spark flame.

The secret of contract car care is to know what you want when you want it. The game is not for those who merely want to get a little exercise. Out of the contract class are those car owners who think that carbon binder solvents are ineffective just because in their experience they are unable to get results. A contract player would suspect that either the solvent injector was inefficient or that he himself did not use it properly. Just to be sure about this he would warm up the engine and squirt the solvent directly into the cylinders through the spark plugs, using a small syringe for this purpose. If the carbon "pinging" disappeared he would then know that the trouble had been with the injector, or with its use.

It is necessary to practice a few times in order to make sure that the solvent that is drawn into the cylinders stays there and does not go out through the exhaust. The motor should be well accelerated and the injector valve opened just as the motor is switched off. There is more likelihood of the chemical solvent remaining in the intake of a large motor than there is of it getting into the cylinders and passing beyond to the exhaust.

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MOVING
CHARGES

natural routes of travel, and the ledge upon which the village was built must have been a veritable Gibraltar for that prehistoric race. Space, however, was at a great premium. The shelf was about 25 feet in width and 500 feet long—and every available square foot was utilized by the close-packed dwellings. With dimensions averaging somewhat less than ten feet to each compartment, that double row of buildings comprised nearly a hundred separate rooms. Backed by a cliff 300 feet high that overhung by ten degrees, substantial shelter from the elements had been afforded by this site.

One feature of especial interest was a large circular kiva, which according to Wetherill, would link this ruin with the famous Keet Seel of Segi Canyon. Half a dozen roof timbers were still in place—large logs that must have required Herculean labor to be raised from the floor of the canyon by primitive methods. Noteworthy, also, was the stone parapet seen from the bottom of the canyon, which might have been built either for the purpose of defense or to prevent absent-minded cliff dwellers from stepping off into space. The pre-historic mothers must have breathed a sigh of relief when that wall was finished, for the mere thought of a youngster toddling to the brink of that cliff would be enough to make one blanch with fear.

Like the other large cliff ruins of the Southwest, the story of this one will remain a mystery, perhaps forever. Conjectures almost without number have been made regarding the history and probable fate of those who built other similar villages. It is generally conceded, however, that for reasons known only to themselves, they migrated to other parts. That this departure was precipitate has been assumed by discoverers of other ruins who found houses in an excellent state of preservation, with pottery and artifacts in place. But here was a condition entirely different: all evidence pointed to the conclusion that the site had been gradually vacated, its decline extending over a number of years or possibly generations. Roofs had been neatly removed from all of the houses save two or three, to be used, no doubt, for fuel. Capstones on many walls

had long served as metates, indicating that some of the inhabitants had remained after the departure of others. Artifacts and fragments of pottery were not plentiful—a further proof that the abandonment had been deliberate and premeditated.

The conclusion to the foregoing observations would be, no doubt, that the inhabitants of this village were immune to those conditions that forced the sudden evacuation of others whose positions were more exposed to attack. By reason of its extreme isolation and difficulty of approach, which have made it unknown to the Navajos of today, this canyon proved to be a refuge unexcelled, where the tranquillity of its denizens remained undisturbed.

Lengthening shadows warned that the hour was late; we must return to our mounts and find the homeward trail. It was with great reluctance that I descended the face of that cliff, where others had climbed centuries before the dawn of our history—others who had lived and labored and loved . . . and then vanished into the oblivion of long ago.

Hostile tribesmen no longer guard the fastness of this once forbidden land; they have become reconciled to that new order which has established Anglo-Saxon supremacy. But the frowning battlements, the precipitous canyons of Black Mesa—what secrets are still held in their keeping? That is a question which time alone can answer!

THIRD DEGREE

(Continued from Page 33)

me about it."

Curzon screamed again. "The arm's numb! I'm dizzy! My God, Tom! I don't want to die this way. You know something—you say the Injuns wised you. Help me, man! Do you aim to let me lie here for buzzard bait?"

"No, I don't, Jack," said the marshal. "You're worth \$10,000 to me and I've earned it. You come through and I'll see that you don't die by any Gila monster."

Curzon was moaning and writhing. He answered:

"That's straight? You'll save me? I won't die?"

"Not from this dose. But you'd better hurry. Feeling worse?"

"Yes! All right, I call you. Yes, I did the job. The swag is safe. You can find it—I'll tell you." And he did. "All but a hundred or two. That's the truth. I swear to God. Now go to work on me. Quick, Tom! I'm getting sicker."

"So you are," grinned the marshal. "Shuck! Well, come over to the hole and I'll bandage up your hand. You've bled enough. A wet rag is all you need but you won't be in shape to try another break—not for a time yet."

Curzon steadied. Was that party haggard face the face of defiance? "Frisco Jack," big-shot headliner? He stammered:

"Water? That brute wasn't poison? You framed me?"

"You can bet he's poison. But you see a Gila monster packs his poison in his lower jaw. He doesn't shoot it like a rattler. He has to turn on his back to flow his spittle into the teeth wounds. This fellow didn't have the purchase to turn over. The only thing that turned over was your liver, Jack. You'll have a sore hand; that's all."

Curzon flushed muddy.

"Damn you! Why didn't you put me on? Loke, was it?"

"Fetch along that hand," the marshal ordered. He deliberately laughed. Then he blazed with accusing wrath: "Joke! As you say, Why, you fool, I was just about to show you how he performed, when you jammed me."

WEST COAST BEACHES

(Continued from Page 44)

the Pacific Coast. Its chief concourse is called the Esplanade—an avenue lined on both sides with fine residences. There is a municipal park, extending along the bluffs above the sea, and containing a great profusion of tropical trees and plants, whose propagation is made possible by an almost complete absence of frosts.

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Correct Spelling

OF WORDS IN SPANISH PHRASES

HERE are the phrases, with words correctly spelled, that appear on Page 30 of this issue. Words mis-spelled on that page are printed here in italics.

1. Buenos días, Señor.
2. ¿Cómo está usted?
3. Estoy perfectamente bien, gracias.
4. Tenga usted la bondad de sentarse.
5. ¿Cómo se llama á usted?
6. Me llamo Don José Rodríguez, servidor de usted.
7. ¿Cuál es su profesión?
8. Soy licenciado.
9. ¿Qué se le ofrece á usted?
10. Deseo de platicar con usted sobre unos asuntos legales.
11. Siento mucho, pero estoy muy ocupado ahora.
12. No le hace, volveré otra vez.
13. Favor de volver mañana mañana.
14. Muy bien. Hasta luego, Señor.

Oklahoma

Sak & Fox Numerals 1-10 - Journal 109 Vol. 1

Sept. 23-24.

SAK and FOX Indians--Oklahoma

Sept. 23, 1904. World's Fair Grounds, St. Louis, Missouri:

Met a couple of girls from Oklahoma belonging to the Sak and Fox tribe, whose proper name they gave me as Thahl-kee.

Their numerals up to ten are:

- 1 - - - Nā-koot
- 2 - - - Nee'sh
- 3 - - - Neth
- 4 - - - Ne-ār'
- 5 - - - Ne-ahn'-nan
- 6 - - - Nik-koo-tosh'-ik
- 7 - - - No-hik
- 8 - - - Nish-wash'-ik
- 9 - - - Shah'k
- 10 - - - Met-tah'-th

--C.H.M. Calif. Journal, Vol.1, p.2, 1904.

Oregon : Takeima

BASKETRY AMONG THE TAKELMA

Edward Sapir, in his Notes on the Takelma Indians of Southwestern Oregon, mentions a number of kinds of baskets in use in this tribe.

Under the head of acorn food, he says: "The acorns were prevented from spilling off the flat rock by a funnel-shaped basket, or hopper, wider at the top and entirely open at the bottom, known as a bõ"n. In the degàs, a shallow circular basket-pan, the meal was sifted and was then placed on carefully washed sand, seething water being applied to extract the elements which impart the bitter taste to the acorn. The acorn dough (xnik') thus obtained was boiled in a basket-bucket (k!el mehelī') constructed of hazel shoots and split roots, the usual Pacific coast method of applying hot stones into the basket being employed." (258)

In another place, he mentions that "baskets of roasted salmon were packed for winter use." (260)

Under the head of Implements and Utensils, he states: "Still other basket forms were the velèx, a large open-work burden-basket constructed of hazel or willow; the p!e^el^e, a small basket-plate to eat out of; the k!õl, a round open bucket-like basket; the k!õlõl, a large storage basket; the k!ánaklas, used for drinking purposes and of the size of a cup; the sàk, a big basket made of rushes; and the basket-cradle. The ordinary twined basket was built up on a bottom (delgán) of four short hazel twigs perpendicular to four cross-pieces, and the twining was done with some root or grass on a warp generally of hazel or willow. The only dyes used in the designs were black and red, the former obtained by keeping the woof strands in black clay, and the latter by dying in alder bark. Designs in white were brought out by means of twining with a straw-like grass known as ge^et" (261)

And under the head of Clothing, he tells us that the hats of the women "were round basket-hats (yūp') twined of a white grass. My informant claimed that the Takelma did not themselves make these hats but got them from the Shasta by the purchase of wives." (264)

In describing the puberty ceremony for girls, he states: "During this time also she was obliged to sleep with her head in a bō~n, a funnel-shaped basket such as was used in the pounding of acorns, the declared purpose being to prevent her from dreaming of the dead, a bad omen." (274)

In connection with marriage, he mentions that "the bride proceeded with her folks to the bridegroom's house, the whole party dragging along a supply of exchange presents in the shape of baskets, women's hats, camass, dried salmon and other such household articles." (274)

~~The use of the blow-pipe, the method of fish-poisoning, employment of hammocks as baby-cradles, clay-plastered houses, and certain facts in ceramic art "are very suggestive of waves of cultural transmission into this region from the Antillean or Caribbean area." Further investigation of this area will doubtless bring to light many valuable facts.~~

TAKELMAN. In the "*American Anthropologist*" (n. s. ix, 251-275) for April-June, 1907, Mr. Edward Sapir has a valuable paper, "Notes on the Takelma Indians of Southwestern Oregon," an aboriginal people now practically extinct. Interesting to the folklorist are the sections on tribal and geographical names; food, fishing and hunting; games, habitations; clothing, personal adornment; numeral system; social organization; war; puberty and marriage; mortuary customs. The information was obtained in the summer of 1906, and, according to Mr. Sapir, "many things point to the Takelma as having really formed an integral part of the distinct Californian area." Takelma "is spoken with freedom by only three or four of the older women now living in Siletz," the other few survivors using "the Chinook jargon, broken English, or some Athabascan dialect." The Takelma children used strings of camass roots for playthings. Smoking tobacco "had a semi-religious character, the whiff of smoke being in a way symbolic of good fortune and long life." In the women's substitute for the game of shinny, "serious quarrels seem sometimes to have ensued from both parties claiming the victory." Girls who were not tattooed "were apt to be derided as 'boys.'" The numeral system is "a fairly transparent case of the adaptation of an older, quinary or even tertiary system to a more advanced decimal type." The social organization "was almost the simplest conceivable" (a table of degrees of family relationship is given). In the case of serious feuds the services of a "go-between," an account of whose proceedings is translated from the native text (pp. 270-272), were secured. With the Takelma, white paint was symbolic of war, "while red was the every-day color used by men and women alike." The only musical instrument known was "a rude flute or fife made out of a dry reed of the wild parsnip," and used for love ditties. The "menstrual dance," connected with the puberty-feast was the most important socially. The marriage-ceremony was devoid of dances and singing. The social status of children depended on the price paid for the mother, and "poor people's children were looked down upon as not much better than dogs." Ground-burial obtained. Widows mourned by "bedaubing themselves with pitch and cutting their hair close." In the case of a man killed in war away from home, "it was customary to burn off the flesh of the corpse, gather up the bones, take them home, and bury them there with the usual valuables." With this paper should be read Dr. Sapir's article in the *Journal of American Folk-Lore* (xx, 1907, 33-49) on "The Religious Ideas of the Takelma Indians of Southwestern Oregon."

A. F. C. and I. C. C.

DOGS AMONG THE TAKELMA INDIANS

Edward Sapir, in an article on the Takelma of Southwestern Oregon, states: The Takelma word for 'dog' (ts'!ixi) is closely related to this group; ^[of northern California] compare for instance, Yurok tsic, Chimariko sitcela, and Nahuatl chichi. The resemblance becomes greater if we suppose, as seems very probable, that ts'!ixi goes back to an earlier ts'itci (the sound tc, curiously enough, does not occur in Takelma but seems always to have developed into x; cf. above yegwēxi, 'they bite me,' but upper dialect yegwétci, probably a more archaic form). This fact of lexical similarity receives some weight from a consideration of the general north Californian character of Takelma ethnology."

Am. Anthropologist, Vol. 9, No. 2, p. 257,
1907.

TATTOOING AMONG THE TAKELMA

5-----

Edward Sapir, in Notes on the Takelma Indians of Southwestern Oregon, says:

"Perhaps the most striking ornamental device used by the Takelma was tattooing with needle and charcoal. Boys did not tattoo, but for girls it was considered proper to have three downward stripes tattooed on the chin--one in the middle and one on each side -- as well as to tattoo the arms; in fact, girls who were not tattooed were apt to be derided as "boys." The tattooing of the men was rarely facial, but was generally confined to a series of marks on the left arm, reaching from the elbow to the shoulder."

Am. Anthropologist, Vol. 9, No. 2, p. 264,
1907.

USE OF ACORN FOOD BY THE TAKELMA INDIANS

Edward Sapir, in Notes on the Takelma Indians of Southwestern Oregon says:

"The staple food of the Takelma is probably to be considered the acorn (yahə), of which there were recognized several varieties; the 'black acorn' (yana yáhal^s) being considered the chief. The first acorns appeared in the early spring, at which time they were gathered and prepared by the women, who, however, were not permitted to partake of them until the men had performed a formulaic ceremony and themselves eaten; only then, and after the vessels had been washed anew, could the women also take part in the first eating. The method of preparation was essentially the same as that employed by the Hupa and the Maidu. A hole about an inch in depth was cut into the ground so as to hold firmly the p!e^s, a flat rock on which the acorns were pounded. After these were shelled they were

mashed fine by means of the s'elǝk'^w, a stone implement, used for the purpose, of two to three feet in length, or else by the shorter t'élma, of about a foot and a half in length. The acorns were prevented from spilling off the flat rock by a funnel-shaped basket, or hopper, wider at the top and entirely open at the bottom, known as a bō'n. In the degas, a shallow circular basket-pan, the meal was sifted and was then placed on carefully washed sand, seething water being applied to extract the elements which impart the bitter taste to the acorn. The acorn dough (xnik') thus obtained was boiled in a basket-bucket (k'el mehelī') constructed of hazel shoots and split roots, the usual Pacific coast method of applying hot stones into the basket being employed. The final result was a sort of mush that here, as farther south in California, formed the most typical article of food."

Vol. 12, no. 2. April-June 1910.

~~made. One small oversight may be mentioned: it is said (p. 246) that "the Semitic peoples worshipped many of their kings when they were alive, e. g. at Babylon, in Moab and Edom"; in the Semitic area living kings were considered to be divine only in Babylonia, and there only for a limited time (about B. C. 3000-2000), and it does not appear that even there they received divine worship.~~

C. H. Fox.

Takelma Texts. By EDWARD SAPIR. Anthropological Publications of the University of Pennsylvania, vol. II, no. I: 1909. 10 $\frac{3}{4}$ X 7 $\frac{3}{4}$, pp. 263.

In this volume Dr Sapir has made available a considerable number of texts in the Takelma language which are important for the student of linguistics and folk-lore alike. It is quite clear from internal evidence that very great pains have been taken in phonetic matters, and an elaborate key is furnished (pp. 8-11). The texts themselves are divided into three classes, namely, (I) myths, of which there are twenty-four; (II) customs and personal narratives, six in number; (III) medicine formulas, numbering eleven. The last, with interlinear translations and explanations of the meanings of the charms, were published originally in the *Journal of American Folk-Lore*, vol. XX, pp. 35-40. In this connection it should be observed that interlinear translations are provided for the first five myths also. A vocabulary at the end completes the book.

Owing to the lack of published mythological material from Oregon, or the near neighborhood¹ it is impossible for the reviewer to make an extended criticism of the contents of the volume, and he must content himself with some remarks concerning the externals. Yet these should by no means be neglected as Professor Lanman has recently shown in his notes on the "Externals of Indian books."

The first point that I find fault with is that the lines of the pages are not numbered. Hence easy reference to the book will be seriously impaired. It is clearly for this reason that in the vocabulary references to the texts are apparently lacking. The next point is that interlinears are provided for in only a small portion of the texts. However, as interlinears for the third part were published previously, perhaps we should not grumble too much. It may be mentioned, however, that misprints such as Atbabascan (p. 119, footnote), are very rare.

TRUMAN MICHELSON.

¹ This was written before the appearance of Dr Dixon's *Shasta Texts*.

Dennis, writing in 1672 of the Micmac Indians of Nova Scotia states:

"They drank only good soup, very fat. It was this which made them live long and multiply much. They would have multiplied still more were it not that the women, as soon as they are delivered, wash the infant, no matter how cold it may be." — Lanou's Translation, 403, 1908.

The battle at or near Pierre's Hole which took place on July 17, 1832, between Captain Sublet's band of trappers (with which Captain Nathaniel Wyeth chanced to be at the time) and a party of Blackfoot Indians was brought about by gross treachery on the part of one of Sublet's men, named Antoine, who, in company with one other man(a Flathead chief). had been sent out under a flag of truce to meet the Blackfoot Chief. As the Blackfoot took the Flathead's hand in token of friendship, Antoine shot him dead. *Thereupon* the Blackfoot warriors displayed a red flag and the battle began-- with disastrous results on both sides. Of Sublet's party, 7 white men and 25 Indians were killed; and 13 whites and 35 Indians wounded. How many Blackfoot were killed and wounded was not known as under cover of darkness most of them were carried away.-- John B. Wyeth's small book entitled Oregon. Cambridge, Mass., p. 49, 1833.

In a little book entitled 'Oregon ; or a Short History of a Long Journey' By John B. Wyeth, published in 1833, the author tells the following story of the extraordinary distance at which a horse may detect an enemy: Wyeth was traveling ~~was traveling~~ in eastern Wyoming with Capt. William Sublet, a well known fur trader, who, at the time was on his way from the Rocky Mountains to St. Louis with a precious load of furs. It was Captain Sublet's practice to keep an advance guard of seven men about two miles ahead. One day when riding forward as usual, the horses of the advance guard suddenly refused to go on, turned round and appeared alarmed, but the riders were unable to see any cause.

When Captain Sublet came up he said the behavior of the horses indicated the presence of an enemy, and he apprehended an attack by Indians in a valley several miles ahead. After riding a few miles they discovered a large moving body which they knew must be either buffalo or Indians. On coming nearer they proved to be Indians. It is hard to say whether the horses in question detected the distant enemy by smell or hearing, but the animals ~~was~~ evidently used to surprises ~~and their~~ ^{and their} senses were on the alert.--pp. 64-65

John B. Wyeth, in his little book on the Oregon Expedition of 1832 (published in Cambridge, Mass. 1833, --.61-62) says that a hunters fort ^(apparently in eastern Wyoming) occupied by a dozen trappers and containing a valuable stock of goods was suddenly surrounded by a band of about 600 Indian warriors. The alarmed inmates barred the gates and closed the doors and windows, in preparation for an attack, but with little hope of repelling such a powerful host of well armed savages. But when the Indians saw them shutting themselves up they displayed a white flag and made signs to the white men to open the fort, for they came to trade and not to fight. Accordingly, the doors were unbarred and the chiefs admitted with every expression of cordiality and confidence. After remaining nine days the Indians departed in peace, and the whites did not miss a single article, though axes and many other things desired by the Indians were lying about. When Wyeth expressed his surprise at such honesty, the trappers replied, "Why, the word of these ^{trading} Indians is as good as the bible".

John B. Wyeth, in his 'Oregon, or a Short History of a Long Journey', published in 1833, quotes the following from 'W.J.S.':

"About twelve years since, it was discovered by a public-spirited citizen of St. Louis, that the supply of furs was not equal to the demand. To remedy this evil, he raised a corps of sharp-shooters, equipped them with guns, ammunition, steel-traps, and horses, and sent them into the wilderness to teach the Indians that their right was only a right of occupancy. They did the savages irreparable injury. They frightened the buffaloes from their usual haunts, ~~++~~ destroyed the fur-clad animals, and did more mischief than we have room to relate". He adds, sarcastically, that "the Indians were wont to hunt in a slovenly manner, leaving a few animals yearly for breeding. But that the white hunters were more thorough spirited, and made root-and-branch work of it. When they settled on a district, they destroyed the old and young alike; and when they left, they left no living thing behind. The first party proving successful, more were fitted out, and every successive year has seen several armed and mounted bands of hunters, from twenty to a hundred men and more in each, pouring ~~~~~

ing into the Indian hunting grounds; and all this has been done in
and direct
open violation of a law of the United States, which expressly for-
bids trapping and hunting on Indian lands. The consequence has
been that there are now few fur-clad animals this side the moun-
tains". Wyeth adds: "What right have we to fit out armed expe-
ditions, and enter the long occupied country of the natives, to
destroy their game, not for subsistence, but for their skins?
They are a contented people, and do not want our aid to make them
happier. We prate of civilizing and Christianizing the savages.
What have we done for their benefit? We have carried among them
rum, powder and ball, small-pox, starvation, and misery". (pp. 83-
84).

EXTRACT from 'The Present State of Hudson's Bay', pp.184-185.

Edward Umfreville, writing of the conduct of the Indians in dealing with the Hudson's Bay Company in the early days says: "An Indian with his wife will embark in his canoe four packs or pieces of sixty or seventy pounds each; which he takes down through rivers and lakes unfrequented, and known perhaps only to himself. In doing this it often happens that no other canoe is in the company, and he frequently has the fairest opportunity possible of going off with the property committed to his care, which probably would enable him to live in affluence for years to come. Nor would there be any possibility of the owners discovering his retreat if he choose to adscond. And yet, notwithstanding the temptation is so great, after a trial of fifteen years, it is a well-known fact, that not an instance has transpired of any embezzlement being made: on the contrary, the whole of these little cargoes are delivered up with as much punctuality, as if their future welfare depended on their honesty. The only reward for this singular service, which is a very considerable saving to the Company, is the value of six beaver skins, paid for each pack or piece, and the further gratification of a small quantity of English Brandy; which they receive on their arrival at the settlement. (pp.184-5)

Utah

Indians of Utah.

The President, J. W. POWELL, remarked that many years ago he commenced the study of the tribes of Utah, belonging to the Shoshonian stock. He found them scattered throughout the Territory in small bands, with their homes adjacent to great springs and smaller water-courses. Each little tract of country thus occupied had its distinct name, and the body of Indians resident therein took the name of the district which they inhabited. In asking a person to what people he belonged, he found that the idiom of the language expressing that question signified, "How are you land-named?" This body of people taking the name of a district of country was not found to be a gens or clan. It seemed to be a segment of a tribe, composed of segments of two or more gentes. The body politic thus constituted was found not to be very permanent. Individuals or families might move from one such body to another at will.

Am. Anthropologist, Vol. II, No. 1, p. 61, Jan. 1889.

May. Ed. McGarry 1862 - Utah
killing Indians

Killing Indians in Northern Utah by U.S. Troops in 1862.

In a letter dated Camp Douglas, Utah, November 28, 1862, Major Edward McGarry states:

"I have the honor to report that, agreeable to in-structions of the Colonel commanding the district, I left this camp on the night of the twentieth instant and proceeded to Cache Valley, where I arrived about 11 o'clock P. M. on the twenty-second, distance one hundred miles, where I was met by Mr. Van Orman, the uncle of the emigrant boy you ordered me to rescue from the Indians. He informed me that Chief Bear Hunter was encamped, with thirty or forty of his tribe, Shoshones, Snakes, and Bannocks, about two miles distant. I left the horses in the settlement called Providence, in charge of a guard, and started about 1 o'clock for the Indian camp. The night was dark and cold, and we did not find the camp until the morning of the twenty-third. I then divided my command into three parties, under Captain Smith, Lieutenant Conrad, and myself, with instructions to surround the camp and close in upon them at daybreak. I found in a tent two squaws. The Indians had all left that night, as I perceived that the fires in their huts were not extinguished. I then returned to where I had left the horses, at which place I arrived about 7 o'clock A. M. Captain Smith brought in one Indian, caught in trying to escape; I made a prisoner of him. About 8 o'clock a party of mounted Indians, [I should think [thirty or forty, armed with rifles, bows and arrows, made their appearance from a cañon on a bench between the settlement and the hills, about a mile from the settlement, and made a war-like

display, such as shouting, riding in a circle, and all sorts of antics known only to their race. I immediately ordered my men to mount, divided them as before, sent Captain Smith to the right, Lieutenant Conrad to the left, and I took the center, driving the Indians into the cañon. When I arrived at the mouth of the cañon I halted for the purpose of reconnoitering; just at that time the Indians upened fire upon Lieutenant Conrad. I then ordered my men to commence firing, and to kill every Indian they could see. By this time the Indians had possession of the cañon and hills on both sides. I found it would be impossible to enter the canon without exposing my men greatly. I therefore reinforced Lieutenant Conrad on the left of the cañon, with orders to take the hill on the left of the cañon at all hazards. About the time the reinforcements reported to him, Chief Bear Hunter made his appearance on a hilltop on the right, with a flag of truce (as I was informed afterwards); I at the time took it to be a war-like demonstration. A citizen who heard his halloeing came up to me and told me that the chief said they did not want to fight any more. I then ordered my men to cease firing, and told him to say to the chief if they would surrender and come in I would not kill them, which terms they acceded to. Chief Bear Hunter with twenty or more of his warriors then came in. I took them into the settlement, took Bear Hunter and four others that I thought to be prominent Indians and examined them (through an interpreter) as to the whereabouts of the white boy, and ascertained that he had been sent away some days before.

I told Bear Hunter to send some of his tribe and bring the boy to me; that I should hold the five as hostages until they delivered him to me. He dispatched three of his men, and they returned the next day about noon with the boy. I then released Bear Hunter and the four others. I killed three and wounded one Indian in the fight. I was told by Bear Hunter that an Indian known as Woerber Tom, alias Utah Tom, communicated the information of our approach. In relation to the emigrant stock I was ordered to examine into and bring to camp, I could not find any such, and from the information I could gather I am of the opinion that all, or nearly all, of the stock taken by the Indians last summer is now in the Humboldt country. I left Cache Valley on the morning of the twenty-fifth, and arrived at this camp on the afternoon of the twenty-seventh, without the loss or scratch of man or horse. It affords me great pleasure to report to the Colonel commanding the good conduct of the command, and during the fight, which lasted about two hours, the officers and men behaved handsomely."--Record Calif. Men War of Rebellion,

1861-1867, by Richard H. Orton, Adjutant General
of California, p. 172-173, 1890.

Notes on The Utah Utes by Edward Palmer, 1866-1877.

In the extensive files of data on western Indians accumulated by Dr. C. Hart Merriam and now on permanent deposit at the University of California (Berkeley) are some envelopes containing first hand observations on Indians by Dr. Edward Palmer. One such set of memoranda concerns the "Pah Utes" of southern Utah, and these have been copied off as written and are presented without comment as a minor contribution to Utah ethnology.

Pah Ute Territory

①

Pah Ute Nation extended over a great territory in the western half of Colorado most of Utah and part of Arizona. It was once a mighty nation, but now divided into bands or tribes.

Any man who had a little influence, and could get two or three lodges would start off and make a new band and thus they were split up. When a chief died, his band divided among others.

For a long time these chiefs had not been ^{hereditary} hereditary.

Tabwah band had once lived with the Comanches and Apaches but when these Indians obtained horses they drove the Moquis into the Canons and ledges & occupied the country themselves.

Ute Indians.

(2)

Fort Union N. Mex.

Indians want revenge upon
a Mexican.

1866-

Utes known in New Mexico are found in the mts north of Taos and frequently come on the plains to hunt. While we were at Ft. Union a flock of sheep guarded by the usual pastor, a Mexican lad was set upon by a small party of Utes. They wanted but one sheep which they killed & took having killed two others want only which they left on the ground.

Immediately after came another Indian, the son of Kaniatse, the Ute chief, who also wanted a sheep. The Mexican told him to take one of those just killed by his comrades. No, he would kill another. The Mexican said he should not where upon the young Ute drew his bow & arrow on him & immediately the Mexican shot him.

This occurred on the Little Cimarron, some 50 miles from Ft. Union. The herdsman fled to the Ft. for protection and while we were there old Kaniatse accompanied by a dozen of his warriors among whom were his two sons, brothers of the one just killed came in. Their demand

was simply that the Mexican should be delivered up to them. They wanted to hear nothing of provocation or justification; blood of one of theirs had been shed ^{and} they must have the Mexican.

Old Kaniatse appeared to be not unreasonable. but the two sons could scarcely restrain themselves. I never saw so much devilish passion painted on a human face. While we remained at the Fort, four days the parley was still going on, it being thought best to prolong it ^{and} let the savage passion cool.

One circumstance it was thought had a decidedly healthy effect upon their understanding. While they were there a full regiment of Infantry ^{and} another of regular Cavalry came in ^{and} encamped near the fort. These added to our large train made a more imposing military force than these Indians had ever beheld. ^{and} old Kaniatse was heard to say indicating the different camps, "~~Soldados~~ soldados, soldados, todos soldados."

I do not know the result of their mission but it is more than probable they went off pacified with a few gifts (Pueblo Indians

Pah Ute Indians ⁽⁴⁾

1. Trading with them.

St. Thomas

Utah
They can tell difference between
Mormon & Gentile.

No sooner had I arrived at St Thomas, than the Indians, came up, looked at me then declared that I was no Mormon. ^{and} as long as I staid ^{and} fresh Indians came in they all declared that I was no Mormon as soon as they caught sight of me.

How they could tell at sight is known only to themselves. It is certain they can tell a Mormon at any time. Let a new comer make his appearance ^{and} they will quickly say what he is, a Mormon or Gentile.

Many questions were asked me by both sexes as to what I was going to do with their baskets &c. that I had purchased of them. Many a joke was had at my expense. More was brought than was wanted ^{and} they could not or did not want to understand why all were not taken that they offered for sale.

The chief inquired if I was like other white chiefs who had promised them things but never sent them, being informed who I was & what was my object he was satisfied.

2.

The Indians at once recognized I was not a Mormon, shook hands with me. ^{and} said "You are no Mormon. you Mericat." their term for American.

The sight of silver money soon unlocked reserve. It produced a wide spread desire to sell everything they had.

In purchasing a rabbit net the price was too great. ^{and} the chief said "It is all same to us, as gun to you - you much money gun Indian. - much money for net" A purchase was made satisfactory to them.

Pah Ute. Sale of Prisoners ⑥
At the advent of Whites Among them

The Pah Utes when they first whites came among them was in the habit of stealing children from any tribe with whom they were at variance and trading them off to the tribes with whom they happen to be at peace and took especial pride in capturing Mexican children which were treated like Indian children ^{as} Prisoners was sold.

There was however exceptions, sometimes especial liking would be entertained for a child which would be brought up as one of the family, this saved them from sale

Females captured in battle was generally traded off, sometimes one would be retained by the captors and cruelly used, or if young would become wives of the conquerors

Pah Ute Indians ⑦

1. were once Slaves to Moquis.

This tribe have a tradition that they were once slaves of the Moquis who once lived in what is now known as Utah.

The Indians from the North waged war upon them & drove them all across the Colorado river, the Moques agreeing never to recross the river.

I see nothing improbable in this. All the tribes living in that part of the country acquired from Mexico were in the habit when at war or at variance with each other to kill all their male but spare their female enemies who became wives in some & slaves in other tribes.

In the former case there would be a firmer blending of the two while in the latter the slaves were harshly used, compelled to perform every species of drudgery while at same time compelled to become the mistresses of their masters who might have besides one or more legal wives according to the custom of the people of the tribe.

Children born under the like circumstance with their mothers would become estranged from their task masters & if the children did not intermarry with their father's tribe they would soon become numerous by intermarrying among themselves & should

an enemy descend upon their task masters
& conquer them. the slaves might desert their
masters, assume their independence or even
fight against them so as to gain their
liberty. The Pah Utes seem to have de-
serted their masters, the Mogies, after their
overthrow, set up for themselves and became
a numerous people.

Pah Ntes Mode of Sleeping ⑨

Several Pah Nte Indians after their curiosity was satisfied by watching my movements, laid down to sleep in the following manner. They gently bent down bringing their hands under their foreheads, the former resting on the ground, but supporting the head, the knees at the same time was drawn up to near the chin, this mode of going to sleep would not be acceptable to many the hands would not be considered a very soft cushion, nor would the attitude of the body with the knees pressed up to near the chin be an agreeable promoter of sleep.

But its their custom, and for hours did they ^{thus} sleep as sound as any one could have done on the softest bed

1 Selecting a wife by Pah Utes (10)

Pah Ute Indians in selecting a wife if he can steal off with the one of his choice he is safe; But if he is found out all the males come forward and contest his right to the female when a grand hauling manling and wrestling takes place and the would be Bridegroom if he is the best man and tires out all contestants takes the bride, if not she slip over to the one who is. On the other hand an Indian gives out that he is going to take a certain squaw for a wife, then all who want to contest his strength comes forward and a fierce encounter wrestling

² And pulling match is the result ⁽¹⁷⁾
which often last for hours and
if the chosen female comes in
sight then she is also assailed
pulled and dragged about until
the contest is decided by one
whipping all and taking her
off or as is sometimes the case
killed. Many are injured for life
in these contests - Late years
white men have sometimes taken
the part of the females by rescuing
them from contestants, this being
the case the Indians consider
the white men have fairly won
the females and want them
to take them which is not done

Cradle Pak Mtes

(12)

cradle for females to fasten their children in, suspended to their backs, when the children become to long for the cradle, the mother fastens the feet to the bottom of the cradle which forces the knees upward and outward which must be a painful a painful mode of carriage to the child

Paint Pah Mtes ⑬

Paint in use by the Pah Mtes
is obtained from a mine 150
miles S. E. of St George Utah
it has furnished these Indians
a much used commodity and an
article for trade with other
Indians.

(14)

Neglect of the Sick by
The Pah Mtes

These Indians if one becomes sick. A hovel is made made and the sick put therein to die in solitude and neglect some times an old blanket is all the clothing and bed with the addition of a little grass - and a very little food is given as if desirous to get rid of those as soon as possible when they could no longer look out for themselves.

(15)

Abandonment of Sick by Pah Ute Indians

A party of these Indians camped at Johnson Utah, the was taken sick the rest moved off leaving the sick among some rocks to starve, by accident the people of the place heard of it and kindly cared for the poor Indian until he died, then they buried him.

As soon as he was seen a great commotion was caused, they concluded it was the ghost of the sick man, fled leaving some of their food behind which the sick man ate, after resting he followed after them, overtook them and caused another panic.

A white man came up at the time he told them the sick man appeared among them because they tried to bury him.

He took much to convince them that it was the sick man and not his ghost. Some time after they returned, they said they will kill him if they are traveling.

Pah Ute Indians. (16)

Cremating the Living Sick

Their cruelty towards the sick is great. In former days they often piled up wood, placed the living sick thereon ^{and} set fire to the pile, thus consuming the living.

On one occasion some years since on the St. Clara river Southern Utah, an attempt was made to cremate a living Indian. The fire was lighted, the sick man placed thereon ^{and} left to burn. As the well Indians supposed for they moved on to a new camp. The sick man sprang from the fire much injured ^{and} followed after his people ^{and} found them in camp. As soon as he was seen a great consternation was caused. They concluding it was the ghost of the sick man, fled leaving some of their food behind which the sick man ate, after resting he followed after them, overtook them ^{and} caused another panic.

A white man came up at the time ^{and} told them the sick man appeared among them because they tried to burn him. It took much to convince them that it was the sick man ^{and} not his ghost.

Some time when they are tired of their sick they will kill them especially if they are traveling.

Pah Ute Indians ⁽¹⁷⁾

Cremation

Upon the death of an Indian of this tribe, a pile of wood is prepared in the immediate vicinity, formed into a rectangle and two or three feet high.

The corpse is laid upon this when the fire is started after which wood is continually thrown across the pile until the body is reduced. All his valuables are thrown upon the pile, the remains are then covered with earth.

Now they begin to bury their dead more often than burning them.

Pah Utes Indians (18)

Cooking by Heated Stones.

A quantity of rocks are piled up. a hot fire is made over them. ^{and} when hot the ashes are brushed off water is profusely sprinkled over these, then greens. or native plants, of which these Indians eat many, are laid over the steaming hot rocks. which soon reduce the fresh, green mass to an edible compound. greatly relished by these Indians.

Young grass. ^{and} clover. are often thus cooked to eat.

Piles of stones that have been used for this heating process. are often met with in Utah ~~and~~ Nevada.

Pah Ute Indians. (19)

Bake Stones.

These Indians have a curious mode of baking small animals & birds in use previous to ^{and} after the settlement of the country by whites.

It consisted in digging a round hole ^{and} lining it with cobble stones which are closely placed side by side ^{and} a little in the ground; wood or brush laid over ^{and} burned until the rocks were sufficiently heated; the ashes were then cleaned out & whatever was to be baked, animal or fowl, were placed in these small heated pits. Reeds or grass were covered over all ^{and} in a short time it was cooked sufficiently. Sprinkling the hot rocks with water aids the cooking very much.

Game of any kind cooked this way was said to be very good.

These, now unused pits or ovens are

(over)

often met with in Utah.

The most noted to find these
bake ovens was five miles West
of North from the City of Beaver
Utah on a bench or narrow piece
of level land covered with sage
brush and contiguous to a piece
of low meadow land near was
many found. Rabbits the favo-
rite food of the Pah Ute Indians
delight to live in sage brush
and when near moist grassy
meadows there they congregate in
large numbers, as was the case
with the above mentioned locality
and this accounts for so many
bake ovens being found there
they are two feet deep - and two feet across
circumference 6 feet sides and bottoms
lined with Cobble stones - These ovens
are not so much used now

Pah Ute Indians ⁽²¹⁾ Manufacture of Pottery -

1870

During my first visit to the Pah Utes I supposed they knew nothing of the manufacture of pottery as none was seen among them.

For fear of being deceived by appearances I instituted inquiries of some old Indian women who said that they made one kind of pottery, a cooking pot. Before white people came among them for a long time they had ceased to make any.

To my inquiry can you make me some exactly like what you once used & made, the reply was yes! A bargain was made and in a few days the specimens were received.

Not long after I visited a locality which many years before had been used often as a camping ground for the Pah Utes. I was agreeably surprised by finding here two broken cook pots which proved to be like the recently made ones showing that these rude people do not readily forget their native arts.

Pah Ute Indians. (22)
Cook Pots & method
of using them..

1870

20926

I had the good fortune of obtaining a large fine specimen of this class of cook pot which was found in cave where it had been left by these Indians.

These cook pots are of a funnel shape. The sharp or lower end being inserted in the ground to steady it, a fire of small sticks is made around it ^{and} in cooking or sometimes when filled with material requiring cooking hot rocks were dropped in, taken out, reheated & returned until the material was cooked done.

Two poles were drilled in the top in which strings were inserted by which the vessel could be secured to a pack ^{and} carried in moving camp.

The two broken pots before mentioned must have been broken twice, the first time a hole on each side of the cracks was drilled & strings inserted to draw the cracks together, at the second breaking they were discarded. I have often found pottery made by Indians which was broken & had nicely drilled holes in the pieces.

Pah Utes - Indians -
Small Pox. (31)

Previous to 1877-

It is said that during the prevalence of small pox among the Indians, those with the least clothing suffered the least and more often recovered than those that not only had a covering of dirt on his body but much clothing.

Central America

Maya

1928-36

HISTORY

Yucatan History Published After Wait of 300 Years

A HITHERTO unpublished history of Yucatan, written in 1639, is being printed by Luis Rosado Vega, director of the Yucatan Historical and Archaeological Museum.

This history of Yucatan, where the Spanish conquerors found the remarkable Mayan Indian civilization, was compiled by order of the Spanish king. Only three hand-written copies were produced. Of these three, only one is known to exist today. It is in the British Museum. This rare manuscript is signed by its author, Francisco de Cardenas y Valencia, a priest in Sotuta, Yucatan.

The book describes the military and religious subjection of the Mayan Indians, records many valuable details about the land and its people. This Mayan history is nearly 50 years older than the famous history of Yucatan written by the monk Cogolludo.

Science News Letter, May 14, 1932

Beginnings of Maya Culture

By E. N. FALLAIZE

21

*Secretary, Royal Anthropological
Institute*

Recent excavations at Lubaantun in British Honduras have furnished results which make it seem likely that further work on this site may throw light on the obscure question of the origin of the early culture of Central America. As is well known, the culture of Central America when discovered by the Spaniards had reached a comparatively high level. Archæological research has further revealed the fact that the races of Central America, and especially the Maya of Yucatan and Honduras, produced work of high artistic excellence, especially in architecture, stone carving, and fresco painting. But even the so called "Early Maya" culture of Copan and Quirigua has a long history of artistic development behind it. Yet no archæological investigation has succeeded in bringing to light any evidence to show what were the earliest beginnings of this highly developed culture, and the lines upon which it travelled to arrive at the pitch of excellence at which we know it. This is the problem which it is now hoped to solve at Lubaantun.

The recent excavations which make this appear possible were carried out by Capt. T. Athol Joyce of the British Museum, England, in company with Lady Richmond Brown and F. A. Mitchell Hedges, to whom the concession to make excavations was first granted by the Government of British Honduras.

The site of Lubaantun lies on a spur between two converging river valleys which lead down to the Columbia river. The top of the spur was levelled and a number of buildings erected upon it, principally pyramids and mounds intended for religious purposes. The sides of the hill were hollowed out into a series of terraces which were faced with blocks of stone. The earlier terraces were subsequently covered over or refaced by additions of later date. In several respects the remains on the site are unique in Maya archæology, and the site itself is the largest Maya site known, being over 600 feet in length and 500 feet broad.

Four different styles of architecture can be distinguished in the building of the terraces and with one exception their chronological relation can be determined. The

(Just turn the page)

Beginnings of Maya Culture

(Continued from page 21)

earliest consisted of perpendicular buildings with excellently cut and well-matched blocks with a regular setback at every few courses. The second is peculiar to Lubaantun, and represents a new phase in American architecture. It is an "in and out" method of building in which each of the second of two courses projects beyond the one below it. The third type consisted of obviously late additions composed of badly cut and ill-matched blocks.

In the fourth style, of which the chronological position has yet to be determined, the buildings are composed of huge blocks of stone, so large as almost to justify the term megalithic. They are over five feet long, two feet high and four feet deep. Masonry of this kind has not been discovered hitherto in Central America though it is known in Peru. The position of these megalithic terraces suggests that they are older than two of the "in and out" pyramids, themselves of very high antiquity.

It is noteworthy that throughout the whole district of Lubaantun there is an entire absence of ornamental carving in stone. The pottery and fragments of plaques and figurines, each with a whistle behind, resemble in style the stone carving of such early Maya sites as Copan and Quirigua. But as the pottery from Lubaantun is derived from surface finds, that which will be found in the lower submerged layers may be expected to reveal sensational finds of a culture even earlier than the earliest Maya culture now known.

It would seem that this British Honduras site has revealed a branch of Maya culture with entirely new characteristics. Many of the structures are obviously of very great age, and the extent of these remains shows that not only must a considerable antiquity be allowed for its inception but the quarrying and cutting of the thousands of stones built in the numerous terraces must have been the work of a highly organized population of considerable size whose labors extended over a long period of years.

Science News-Letter, January 8, 1927

A method of measuring the strength of a dose of X-rays has been developed and is expected to eliminate danger of burns from X-ray treatment.

"Cities" of Maya Land Different From Today's

IF YOU have a mental picture of Mayan Indians living in crowded streets in beautiful stone "cities" down in Yucatan and Guatemala, that picture should be erased.

Dr. Oliver G. Ricketson, Jr., archaeologist of the Carnegie Institution, is attempting to correct this popular impression that the ancient Mayas congregated in great cities. The rank and file of the Mayan people were always farmers.

"The ruins that we see today," explains Dr. Ricketson, "are the civil and religious centers to which the surrounding farmers flocked on market and feast days."

Out from the hub of such civic centers may be still seen radiating in every direction in the jungle the low house mounds where the farmers had their homes. The population around such a center as Uaxactun, in Guatemala, is estimated at no less than 48,000.

Science News Letter, November 24, 1934

well as through his permanent researches. Among those who benefited by his guidance may be mentioned the names of Brieger, Goldmann, Herter, Hürthle, Kast, C. Th. Möerner, Preusse, Röhmman, Schotten v. Udránszky, N. Wedenski. One who came into personal contact with the man could not fail to admire his untiring devotion to science, and to feel grateful for the inspiration derived from him.

LAFAYETTE B. MENDEL.

YALE UNIVERSITY.

ALFRED TRESCA.

THE session of November 27, 1896, of the '*Société d'Encouragement pour l'Industrie nationale*,' under the presidency of M. Mascart, was devoted mainly to ceremonies in memory of the late M. Alfred Tresca, recently deceased. The discourse pronounced by M. Haton de la Goupillière was the main feature of the evening programme.

Monsieur A. Tresca, the son of the

Conservatoire, for many years past, to their department of science. It is an interesting case of 'intellectual heredity,' as the writer has called it. A personal acquaintance, slight, but quite sufficient to confirm the conclusions here reached, impressed the writer also with the fact that the influence of each upon his successor, in this respect, was deep and most effective of result. The three men, talented, industrious and persistent, by similar methods accomplished similarly useful work.

As M. Haton says: "Inheritor of a name illustrious in science and honored also for services rendered our society, he has firmly upheld its prestige. Trained in the school of his father, Henri Tresca, he learned the traditions of industrial science, that difficult science, and, at the same time, traditions of honor and of labor to which he was always faithful." He was always inclined to avoid public notice, "but his colleagues, his students, unanimously render just tribute both to the extent of his work and to its value in instruction." The address closes with an affectionate and graceful tribute of esteem and admiration, of grief and of eulogy.

R. H. T.

CURRENT NOTES ON ANTHROPOLOGY.

ANCIENT MAYAN HISTORY.

A YUCATECAN author, Don Juan Francisco Molina Solis, has recently written a meritorious history of Yucatan (*Historia del Descubrimiento y Conquista de Yucatán*, pp. 911. Merida, 1896). By way of introduction it has a sketch of the ancient history of the peninsula, covering sixty pages.

This discusses the early immigrations, the foundation of the great cities, the establishment of the confederation which for some generations appears to have controlled the peninsula and allowed a peaceful development of its culture, and its unfortunate violent dissolution leading to the destruction of the former mart of Chichen Itzá.

and the capital, Mayapan. This breakdown took place in the first half of the fifteenth century, probably about 1420.

The author presents the surviving fragments of this story in clear and attractive language, basing his statements on the the best authorities and some unpublished documents. His work as a whole is of high character, and will take a worthy rank in the historical literature of Spanish America.

PRIMITIVE DRILLS AND DRILLING.

To bore a hole seems a simple affair, but it took man a long time to learn how to do it. Mr. J. D. McGuire, in the *Report* of the United States National Museum for 1894 (just issued), devotes a hundred and twenty-five pages to the subject. He claims, indeed, in his opening sentence that "The earliest remains of man are found associated with implements of his manufacture in which holes have been artificially perforated." This is incorrect, as the remains of the Chellean period are not perforated, and he himself offers no evidence to that effect. Nor does he give the right explanation for the 'batons of command' of the cave period. They are arrow-straighteners and are still used by the Eskimo.

These are small matters. The article in all its leading features is clear, profound and convincing. He surveys all the forms of drills and hole-making implements of primitive times—pins, bodkins, needles, awls, etc.—and illustrates how they were used and for what purpose. Fire-drills are abundantly represented, and the theory that the Egyptian *Sam* is a drill is ably defended. Numerous cuts render the text easily comprehended, where mechanical devices are discussed.

THE STATE AND ITS SOIL.

PROF. FREDERICK RATZEL is one of the best known students of the relations of earth to man. His prize essay, 'Der Staat

und sein Boden, geographisch betrachtet' (Leipzig, 1896, pp. 127), is a careful discussion of the influence which the soil and its accessories bear upon the character and development of the inhabitants. It considers the state as a 'territorial organism,' explains the connection between the natural and political areas, traces the development of this connection, and maintains the nigh inseparable association of the two.

Prof. Ratzel is always a clear, agreeable writer. His learning is adequate to his subject. To many readers, however, this and his other works will seem to be a little arid and incomplete, from the absence of warmth of touch, of psychical sympathy, or, perhaps, want of consideration for the predominance of the will and the emotions in the affairs and the evolution of mankind.

D. G. BRINTON.

UNIVERSITY OF PENNSYLVANIA.

THE SCIENTIFIC MONTHLY

SEPTEMBER, 1933

THE CALAKMUL EXPEDITION¹

By Dr. SYLVANUS G. MORLEY

ARCHEOLOGIST OF CARNEGIE INSTITUTION OF WASHINGTON

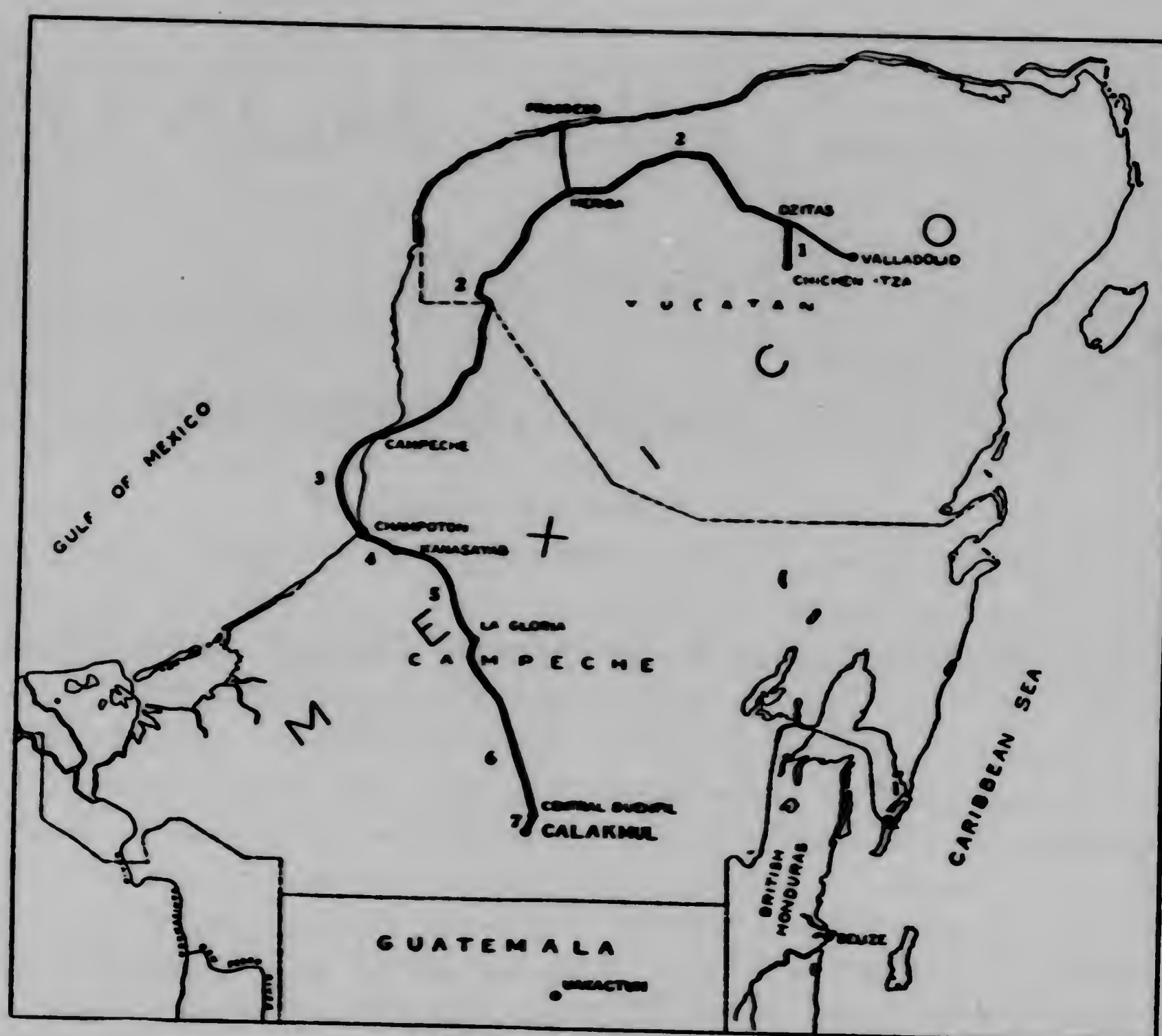
THE expedition reached Campeche on April 5, where Mr. J. C. Brydon, manager of the Mexican Exploitation Company, met the party. The equipment and supplies had been forwarded to San

¹Dr. Sylvanus G. Morley, archeologist in charge of the field work in Yucatan for Carnegie Institution of Washington, headed an expedition, which was sent into an uninhabited part of southern Campeche for the purpose of examining the ruins of an ancient Maya city, discovered a few months before by Mr. C. L. Lundell, an employee of a chicle company operating in the region. When on a scouting trip for his company, Lundell, on December 29, 1931, came upon jungle-covered ruins to which he gave the name "Calakmul," which means, in the Maya tongue, "two adjoining mounds," a name having significance, as Lundell thought, because the two highest pyramids, each about 150 feet in height, stood close together. Lundell took photographs and made a sketch map of the site. A little later, these came into the hands of Dr. Morley, who identified the ruins as being those of an Old Empire City which had been built to the north of the known limits of the Old Empire region. Because of its location so far north, Morley believed the ruins to be of sufficient scientific importance to justify the organization of an expedition to visit it and to make a thorough study of its principal features. Obtaining approval of his plan from the Mexican government and from Carnegie Institution, the expedition left field headquarters at Chichen Itzá, Yucatan, Mexico, on April 3, 1932. Its personnel consisted of Dr. Morley, director, Karl Ruppert, archeologist, J. S. Bolles, architect and surveyor, Gustav Stromsvik, engineer, Mrs. Morley, in charge of the commissary, and two camp assistants. Dr. Morley here gives an account of the journey and of the results obtained.

Dimas, a station on the tram-line between Kanasayab and La Gloria, several days in advance. Mr. Brydon had also engaged two automobiles to take the party the next lap of the journey to the hacienda of San Dimas, 55 miles distant. After an eight-hour drive, the latter part over an all but impassable wood road through the forest, the expedition reached San Dimas at eleven o'clock the same night, where it was most hospitably received by Mr. Sanchez, local manager of the Montana Company, and quartered at the hacienda house.

The next lap of the journey was made over a Deceauville tram on small platform cars, ten feet long, drawn by two mules tandem without reins, the mules being attached to the platform by a single pair of traces. At four o'clock on the afternoon of April 6, the expedition reached La Gloria, the chicle station of Don Francisco Buenfil.

Don Francisco Buenfil, of Merida and Campeche, is the largest private chicle operator in the state of Campeche. He had visited Chichen Itzá earlier in the 1932 season and when he learned of the Institution's contemplated expedition to Calakmul had generously placed the facilities of his organization at its service. Occasion should be taken here to state that the success of the Calakmul expedition was due in large measure to the generous assistance received from



MAP OF YUCATAN

SHOWING LOCATION OF NEWLY DISCOVERED CITY OF CALAKMUL, SOUTHERN CAMPECHE, MEXICO. HEAVY BLACK LINE INDICATES ROUTE FOLLOWED BY CARNEGIE INSTITUTION OF WASHINGTON EXPEDITION FROM CHICHEN ITZÁ TO CALAKMUL.

the members of Mr. Buenfil's efficient organization at all stopping places from Campeche to Calakmul.

The journey beyond La Gloria was made in a five-ton truck over chicle trails that are utterly impassable for motor transport during the rainy season, and not much better during the dry season. The stretch from La Gloria to Central Buenfil, a distance of 70 miles, was covered in 27 consecutive hours, including eight hours out for sleep in the midst of the forest.

The expedition left La Gloria at 3:15 on the afternoon of April 7 and reached Central Buenfil at 6:15 the following afternoon, after a nerve-racking, muscle-beating journey. The truck-pass over the hills was narrow, the truck scraping the bushes and trees on either side and breaking off the lower branches as it lumbered along.

In the *akalches*, or swamps, the lower bush is cleared to a width of about 100 feet so that the sun may reach these marshy places. Although these marshes were nearly dry at the time the expedition passed through them, several bogs were traversed which necessitated chaining short logs to the rear wheels to provide sufficient traction in the bottomless mud.

The expedition was cordially received at Central Buenfil by Don Manuel Osorno, the general manager, and arrangements were made with him for mules to transport the party and outfit the remaining seven miles south to the ruins of Calakmul.

Thirty mules, including pack animals, were required to transport the personnel and outfit from Central Buenfil to Calakmul. Fifteen laborers were employed during the fifteen days' stay at

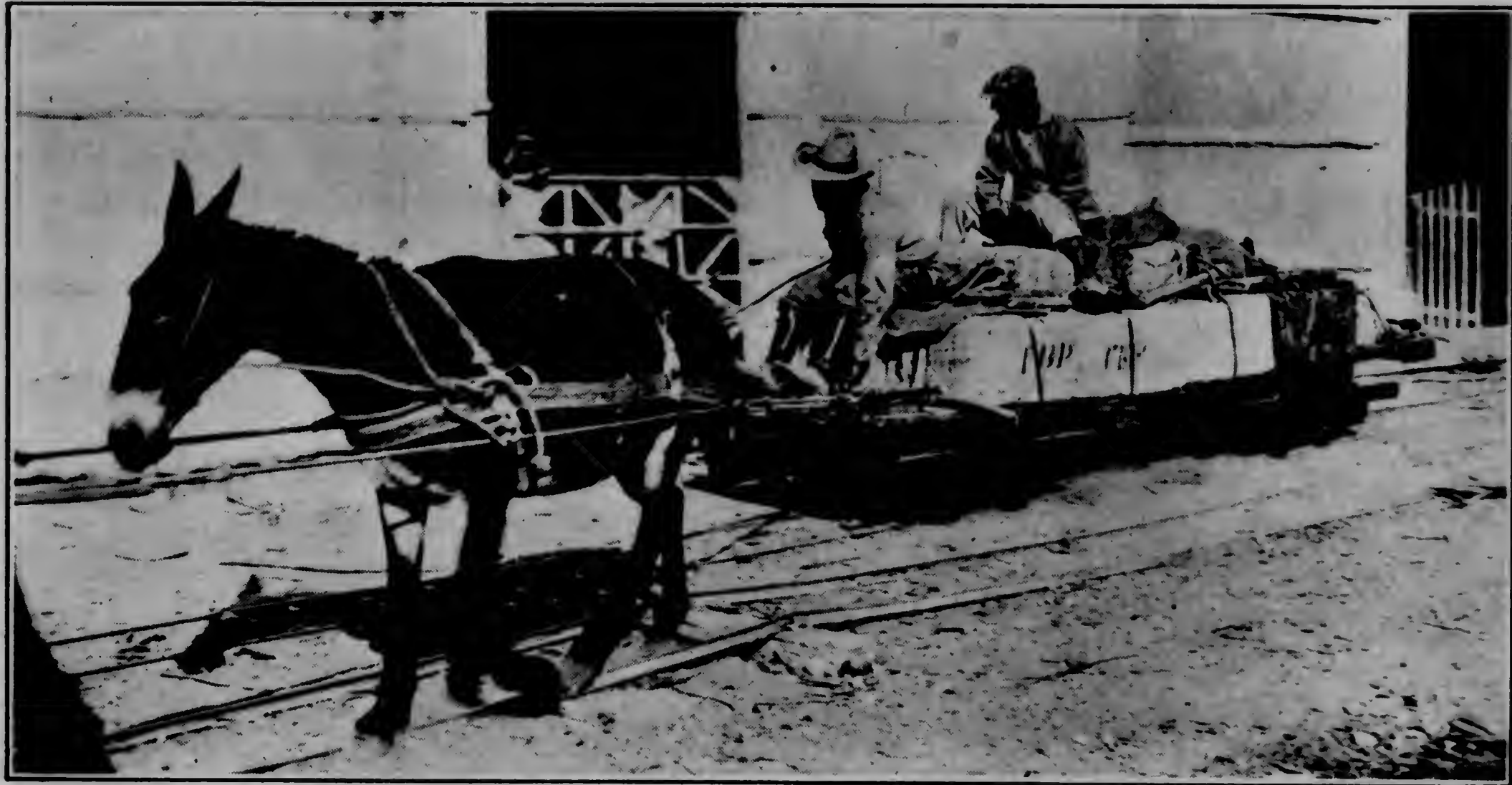
the site (April 9-24) and two camp cooks.

The first afternoon (April 9) was devoted to making camp, putting up tent covers for sleeping quarters and mess hall, building a kitchen stove and table, and arranging the outfit, supplies, saddles, tools, etc.

The following day was one of the most remarkable in the writer's twenty-five years of tropical exploration. With the Lundell sketch map as a guide, the institution party set out to explore the area covered by the map. Lundell had enumerated 64 stelae, or sculptured hieroglyphic monuments, of which the expedition was able to find all but two. One of the missing two was the unsculptured rectangular altar on the summit of the substructure supporting the middle building of Structure D, which Lundell had mistaken for a sculptured stela; the other was not found in the position indicated on his sketch map and it appears probable that he must have confused it with some other stela already accounted for elsewhere. This reduced the total of stelae found by Lundell to 62.

The Carnegie Institution's Calakmul expedition, during the 15 days it was at the site, discovered 41 additional stelae, bringing the total of known stelae at this site to 103, the largest number by 27 per cent. yet reported from any other city of the Maya civilization. The nearest competitor to Calakmul in this respect is Tikal in northern Guatemala, which contains a total of 75 stelae, of which, however, only 18 (*i.e.*, less than 25 per cent.) are sculptured. The Old Empire site having the largest number of sculptured stelae previously reported is Piedras Negras in northeastern Guatemala with a total of 45.

Calakmul, on the other hand, has at least 74 surely sculptured stelae, and of the remaining 29 it is practically certain that another half dozen originally had been sculptured, although their carving has entirely disappeared owing to the softness of the limestone which was used and the excessive weathering to which the stelae have been subjected. It is therefore hardly an exaggeration to say that originally Calakmul probably had almost twice as many sculptured



PLATFORM CAR DRAWN BY TWO MULES, TANDEM

USED IN HAULING OUT BLOCKS OF CHICLE (CRUDE CHEWING GUM) FROM THE INTERIOR. THE CALAKMUL EXPEDITION PERSONNEL AND BAGGAGE TRAVELED FOR FIFTY MILES ON THESE PLATFORM CARS.

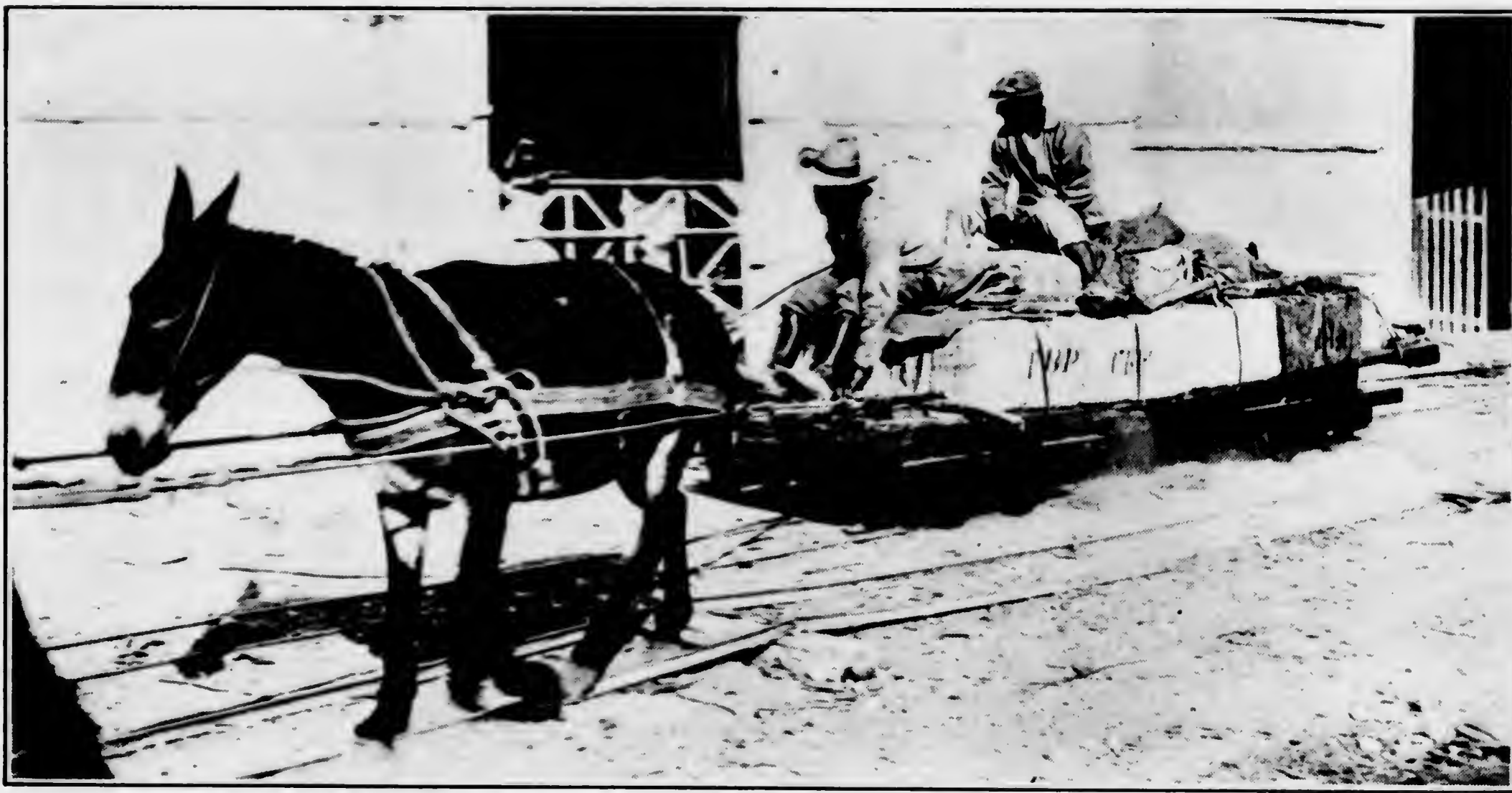
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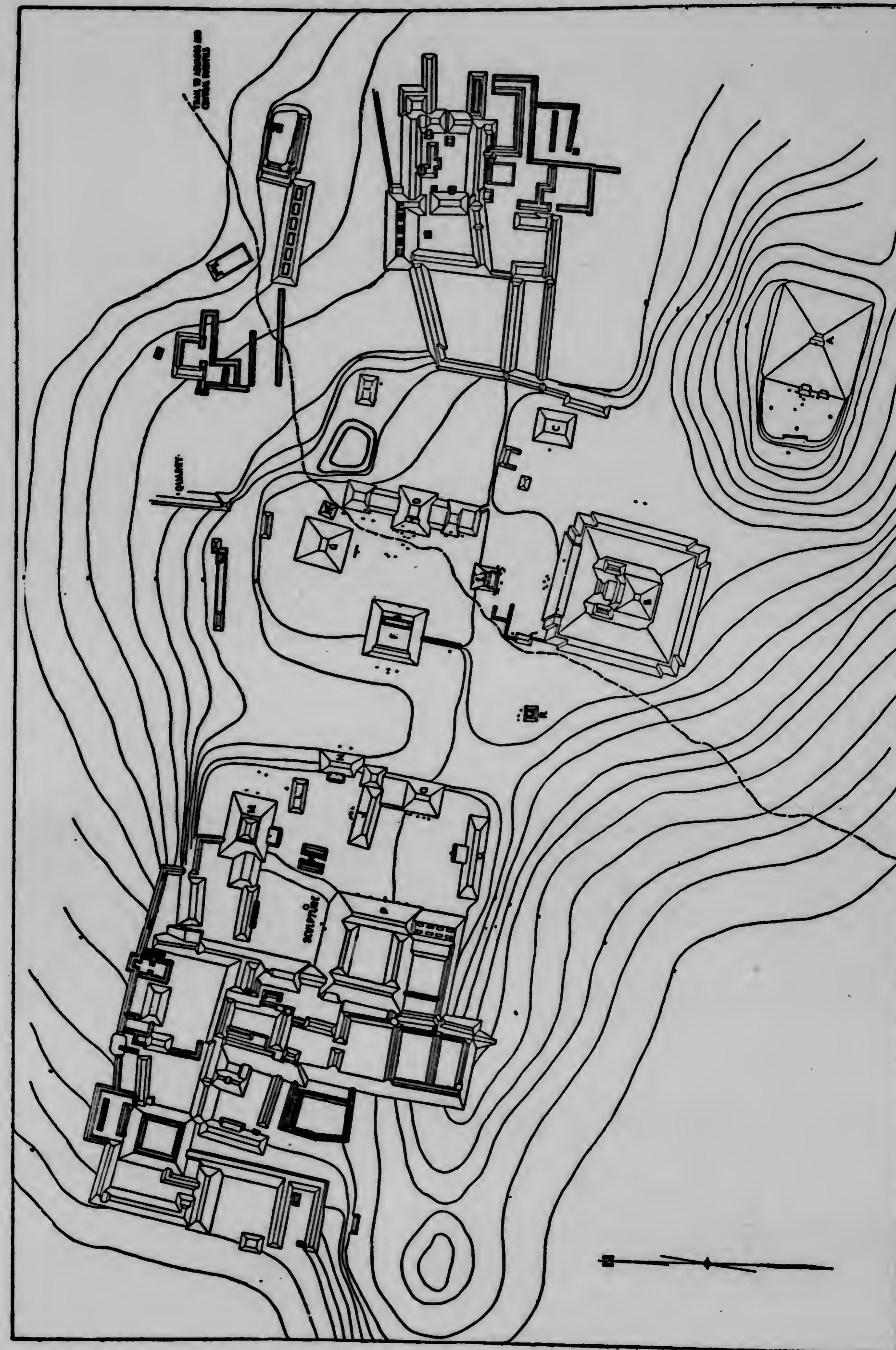
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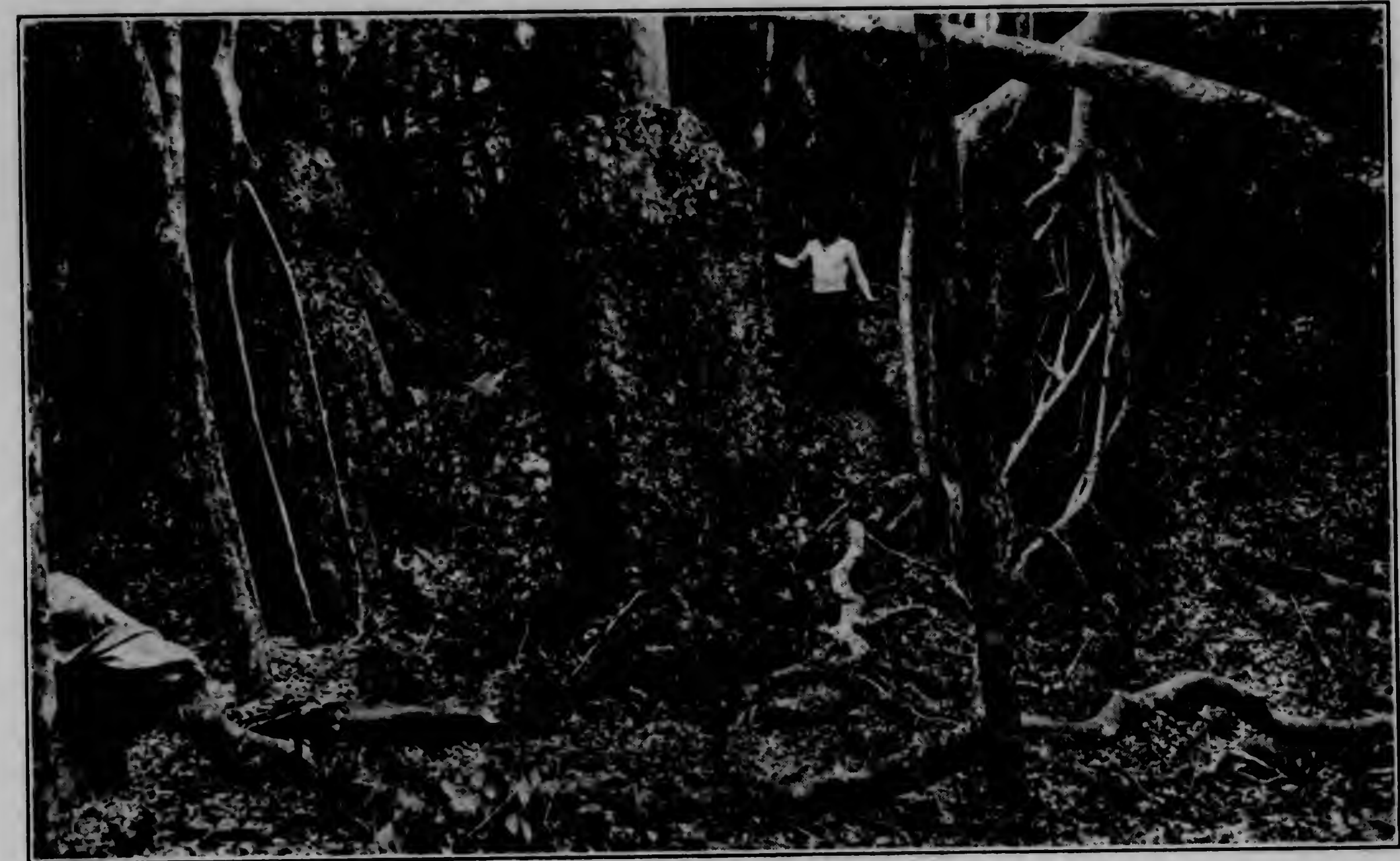
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Retake of Preceding Frame



MAP OF THE CIVIC AND RELIGIOUS CENTER OF CALAKMUL
SURVEYED AND DRAWN BY MR. J. S. BOLLES. THE PRINCIPAL STRUCTURES ARE DESIGNATED BY LETTERS; THE MONUMENTS ARE REPRESENTED BY SMALL BLACK RECTANGLES. NOTE THAT THE AREA BOUNDED BY STRUCTURES D, E, F, G, CONSTITUTES THE MAIN PLAZA OF THE CITY. IT WAS HERE THAT THE STAFF CAMP WAS ESTABLISHED.



THREE SCULPTURED STELAE
AT SOUTHWESTERN CORNER OF STRUCTURE E. THE MONUMENT AT THE RIGHT HAS A WILD FIG TREE GROWING ON TOP OF IT, THE ROOTS COVERING THE FRONT.

stelae as any other Maya site yet discovered.

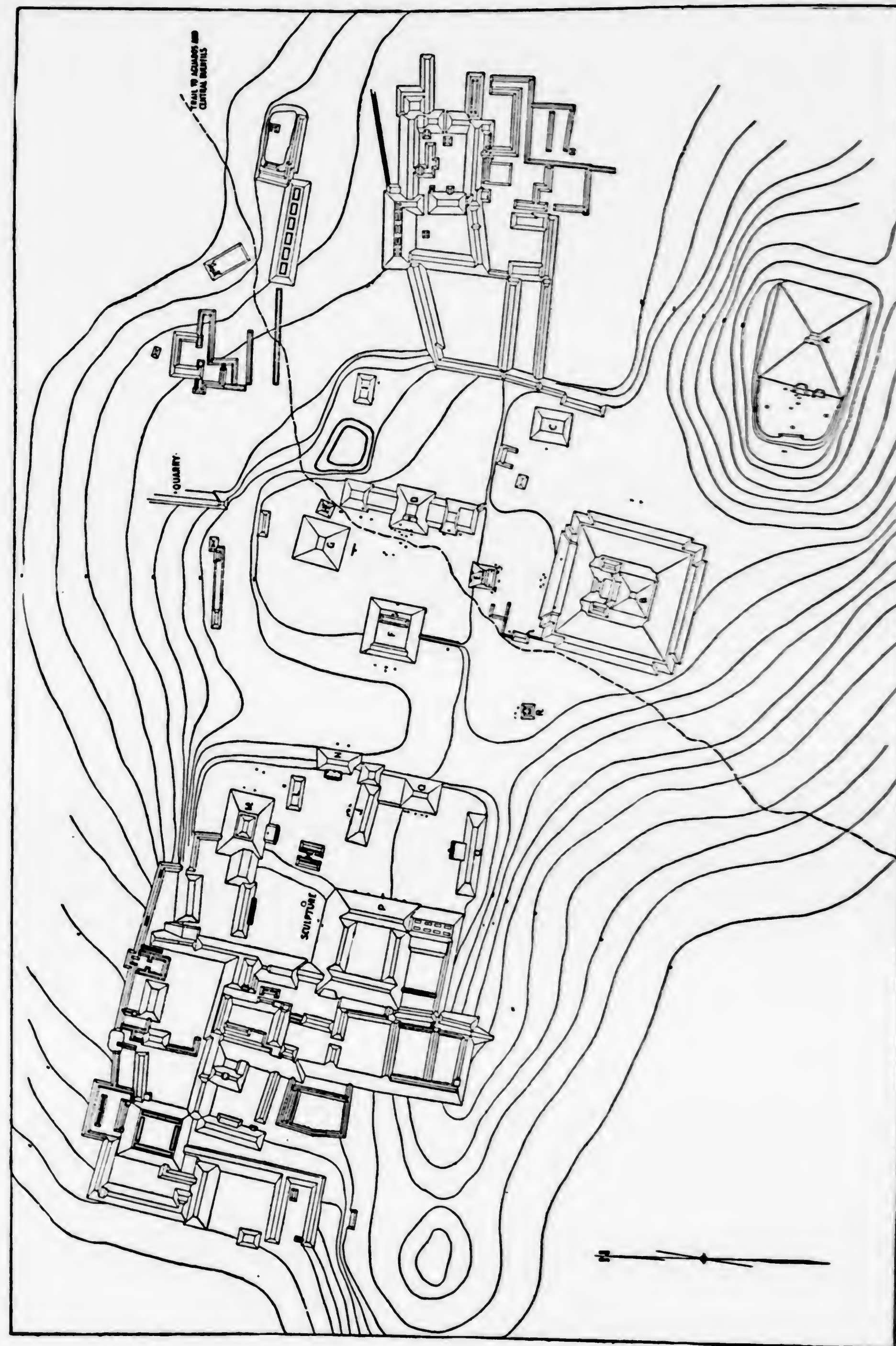
The work of the expedition was divided as follows: The writer devoted his time to the epigraphy, assisted by Mr. Stromsvik who took entire charge of turning the heavy fallen monoliths, some weighing as much as five or six tons, many laying with their sculptured faces downward. Mrs. Morley took charge of the photography; Mr. Ruppert made a study of the architecture, though only one building, Structure C, was sufficiently preserved to allow a detailed ground-plan to be made of it without excavation. Mr. Bolles made a surveyed map of the center of the site, covering an area about three fifths of a mile long by about half a mile wide, and located the positions of all mounds and monuments thereupon. Bolles also determined the latitude of Calakmul as $18^{\circ} 2' N.$ and the longitude as about $89^{\circ} 52' W.$ Finally, in addition to his work in turning the fallen stelae, Mr. Stromsvik made a num-

ber of minor excavations looking for stratified deposits of potsherds; he also made a study of the small stone artifacts which were found, such as *metates*,² grinders, etc.

One of the most important results of the expedition was the discovery of no less than 51 Initial Series, the largest number of these amazingly accurate time-counts or dates ever found at any other Old Empire city except Copan in Honduras. Of this number it was possible to decipher the dates of 42, surely; of two more, probably; and of nine, more doubtfully. In addition to these 51 Initial Series, four Period-Ending dates were identified. In all, the dates of about half of the 103 stelae found at Calakmul may be said to have been correctly deciphered.

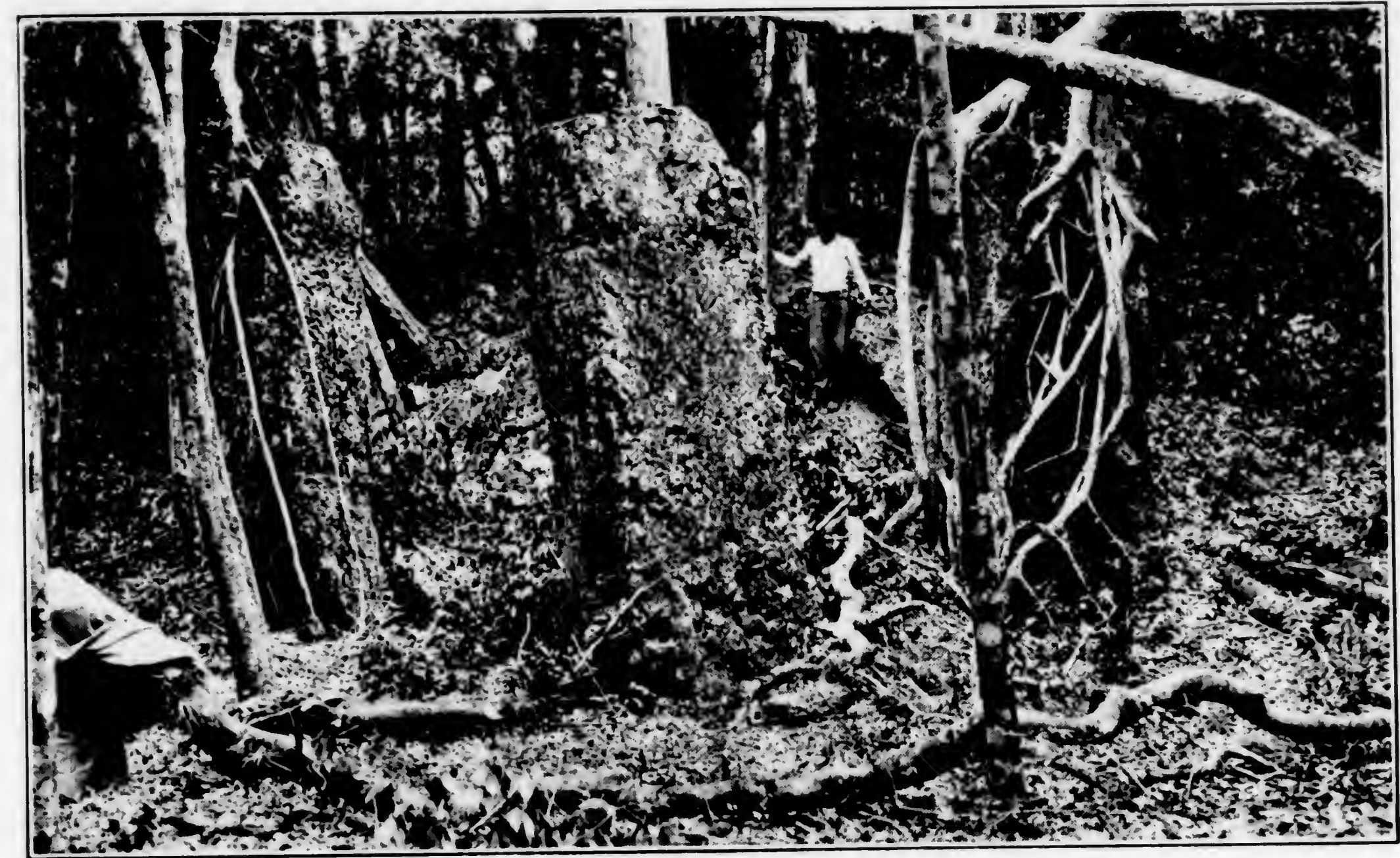
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² The name generally applied to the stone slabs or blocks upon which the American Indian grinds his corn.



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Retake of Preceding Frame

LIST OF DATES DECIPHERED AT CALAKMUL

Monument	Date in Maya Chronology ¹	Date in Christian Chronology ²	Kind of Date
Stela 43	9. 4. 0. 0. 0	254 A.D.	Initial Series
" 28	9. 9.10. 0. 0	364 "	" "
" 29	9. 9.10. 0. 0	364 "	" "
" 1	9.10. 0. ? 5	373 "	" "
" 9	9.10.16.16.19	390 "	" "
" 32	9.11. 5. 0. 0(?)	398 "	" "
" 33	9.11. 5. 0. 0(?)	398 "	" "
" 35	9.11. 8.10. 8	402 "	" "
" 35 ³	9.11.10. 0. 0	403 "	" "
" 36	9.11.10. 0. 0	403 "	" "
" 9	9.11.10. 0. 0	403 "	" "
" 9 ⁴	9.12. 0. 0. 0	412 "	Period-Ending
" 13	9.12. 0. 0. 0	412 "	Initial Series
" 74	9.12. 0. 0. 0(?)	412 "	" "
" 75	9.12. 0. 0. 0	412 "	" "
" 86	9.12. 0. 0. 0	412 "	" "
" 76	9.12. 5. 0. 0	418 "	" "
" 70	9.12. 8. 9. 9	421 "	" "
" 77	9.12.10. 0. 0(?)	423 "	" "
" 93	9.12.10. 0. 0	423 "	" "
" 94	9.12.10. 0. 0	423 "	" "
" 79	9.13. 0. 0. 0(?)	432 "	" "
" 23	9.13.10. 0. 0	442 "	" "
" 24	9.13.10. 0. 0	442 "	" "
" 38	9.13.10. 0. 0(?)	442 "	" "
" 40	9.13.10. 0. 0	442 "	" "
" 41	9.13.10. 0. 0(?)	442 "	" "
" 71	9.14. 0. 0. 0	452 "	" "
" 72	9.14. 0. 0. 0	452 "	" "
" 73	9.14. 0. 0. 0	452 "	" "
" 8	9.14.10. 0. 0	462 "	" "
" 46	9.14. ? . ? . ?	{ 462 "	" "
" 51	9.14.19. 5. 0	471 "	" "
" 52	9.15. 0. 0. 0	471 "	" "
" 53	9.15. 0. 0. 0	471 "	Period-Ending
" 54	9.15. 0. 0. 0	471 "	Initial Series
" 55	9.15. 0. 0. 0	471 "	" "
" 48	9.15. 0. 0. 0	471 "	" "
" 89	9.15. 0. 0.14	471 "	" "
" 26	9.15. 5. 0. 0	477 "	" "
" 25	9.15.10. 0. 0	482 "	" "
" 27	9.15.10. 0. 0	482 "	" "
" 59	9.15.10. 0. 0	482 "	" "
" 60	9.15.10. 0. 0(?)	482 "	" "
" 62	9.16. 0. 0. 0	491 "	Period-Ending
" 57	9.17. 0. 0. 0	511 "	Initial Series
" 58	9.17. 0. 0. 0	511 "	" "
" 80	9.18. 0. 0. 0	530 "	" "
" 67	9.18.10. 0. 0	541 "	" "
" 69	9.18.10. 0. 0	541 "	" "
" 15	9.19. 0. 0. 0	550 "	Period-Ending
" 16	9.19. 0. 0. 0	550 "	Initial Series
" 64	9.19. 0. 0. 0(?)	550 "	" "
" 39	9. ? . ? . ? . ?	 "	" "
" 45	9. ? .10. 0. 0	 "	" "



STELAE 28 AND 29, THE TWO OLDEST MONUMENTS AT CALAKMUL
THEY STAND ON THE NORTH SIDE OF STRUCTURE E AND WERE BOTH ERECTED ON THE SAME DAY, 9.9.10.0.0 IN THE MAYA CHRONOLOGY, WHICH CORRESPONDS TO 364 A.D. IN THE CHRISTIAN CHRONOLOGY, ACCORDING TO THE MORLEY-SPINDEN CORRELATION.

ranged in their chronological order, are given in the accompanying table; the name of the monument appears in the first column; the corresponding date in Maya chronology, in the second column; the corresponding equivalent in Christian chronology, according to the Morley-Spinden correlation, in the third column;³ and the kind of date, i.e., whether an Initial Series or a Period-Ending, in the fourth column. The corresponding terminal dates of these Initial Series and Period-Ending dates have been omitted for convenience in

³ According to the Goodman-Martinez-Thompson correlation of Maya and Christian chronology the dates in the third column are 259 years later.

¹ As noted in the text, 9.4.0.0.0 probably is not the contemporaneous date of Stela 43 but a date perhaps as much as two centuries later.

² Morley-Spinden Correlation.

³ Stela 35 has two Initial Series, though only the second, 9.11.10.0.0, records the contemporaneous date of this monument.

⁴ Although Stela 9 has two Initial Series, the contemporaneous date of this monument is recorded by a Period-Ending date, 9.12.0.0.0.

comparison. Doubtfully deciphered dates are marked with a single interrogation point and very doubtfully deciphered dates with two interrogation points.

In the light of its sculptured monuments Calakmul stands revealed to us as a large, somewhat provincial city of Class 2, which reached the point of erecting sculptured stone monuments at the close of the Early Period (9.9.10.0.0) (see accompanying photograph) and continued the practise until toward the close of the Great Period (9.19.0.0.0) at which time this site seems to have been abandoned, or at least a stage in its social, governmental and economic disorganization had been reached when it

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" 32	9.11. 5. 0. 0(??)	398 "	" "
" 33	9.11. 5. 0. 0(?)	398 "	" "
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" 35 ³	9.11.10. 0. 0	403 "	" "
" 36	9.11.10. 0. 0	403 "	" "
" 9	9.11.10. 0. 0	403 "	" "
" 9 ⁴	9.12. 0. 0. 0	412 "	Period-Ending
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" 75	9.12. 0. 0. 0	412 "	" "
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" 77	9.12.10. 0. 0(?)	423 "	" "
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" 27	9.15.10. 0. 0	482 "	" "
" 59	9.15.10. 0. 0	482 "	" "
" 60	9.15.10. 0. 0(??)	482 "	" "
" 62	9.16. 0. 0. 0	491 "	Period-Ending
" 57	9.17. 0. 0. 0	511 "	Initial Series
" 58	9.17. 0. 0. 0	511 "	" "
" 80	9.18. 0. 0. 0	530 "	" "
" 67	9.18.10. 0. 0	541 "	" "
" 69	9.18.10. 0. 0	541 "	" "
" 15	9.19. 0. 0. 0	550 "	Period-Ending
" 16	9.19. 0. 0. 0	550 "	Initial Series
" 64	9.19. 0. 0. 0(??)	550 "	" "
" 39	9. ? . ? . ? . ?	 "	" "
" 45	9. ? .10. 0. 0	 "	" "



STELAE 28 AND 29, THE TWO OLDEST MONUMENTS AT CALAKMUL
THEY STAND ON THE NORTH SIDE OF STRUCTURE E AND WERE BOTH ERECTED ON THE SAME DAY, 9.9.10.0.0 IN THE MAYA CHRONOLOGY, WHICH CORRESPONDS TO 364 A.D. IN THE CHRISTIAN CHRONOLOGY, ACCORDING TO THE MORLEY-SPINDEN CORRELATION.

ranged in their chronological order, are given in the accompanying table; the name of the monument appears in the first column; the corresponding date in Maya chronology, in the second column; the corresponding equivalent in Christian chronology, according to the Morley-Spinden correlation, in the third column;³ and the kind of date, *i.e.*, whether an Initial Series or a Period-Ending, in the fourth column. The corresponding terminal dates of these Initial Series and Period-Ending dates have been omitted for convenience in

³ According to the Goodman-Martinez-Thompson correlation of Maya and Christian chronology the dates in the third column are 259 years later.

comparison. Doubtfully deciphered dates are marked with a single interrogation point and very doubtfully deciphered dates with two interrogation points.

In the light of its sculptured monuments Calakmul stands revealed to us as a large, somewhat provincial city of Class 2, which reached the point of erecting sculptured stone monuments at the close of the Early Period (9.9.10.0.0) (see accompanying photograph) and continued the practise until toward the close of the Great Period (9.19.0.0.0) at which time this site seems to have been abandoned, or at least a stage in its social, governmental and economic disorganization had been reached when it

¹ As noted in the text, 9.4.0.0.0 probably is not the contemporaneous date of Stela 43 but a date perhaps as much as two centuries later.

² Morley-Spinden Correlation.

³ Stela 35 has two Initial Series, though only the second, 9.11.10.0.0, records the contemporaneous date of this monument.

⁴ Although Stela 9 has two Initial Series, the contemporaneous date of this monument is recorded by a Period-Ending date, 9.12.0.0.0.



THE MOST BEAUTIFUL MONUMENT
AT CALAKMUL

IT IS LOCATED IN FRONT OF THE PYRAMID SUPPORTING STRUCTURE A. THIS STELA (STELA 51) BEARS A DATE WHICH CORRESPONDS TO 471 A.D., ACCORDING TO THE MORLEY-SPINDEN CORRELATION. WHEN DISCOVERED IT WAS LYING WITH ITS SCULPTURED FACE TO THE GROUND WHICH ACCOUNTS FOR ITS EXCELLENT STATE OF PRESERVATION.

was no longer able to erect stone monuments of any kind, either sculptured or unsculptured.

The dates on the Calakmul stelae indicate that the inhabitants of this ancient city marked the ends of the successive five-year periods of the Long Count—the *hotuns*—not only by the erection of a single sculptured monument, as was usually the case, but occasionally, particularly on the *lahuntun* and *katun*-endings (i.e., the ends of the 10- and 20-year periods successively) by the erec-

tion of two, three, four and in one case (9.15.0.0.0) even seven different monuments, one of which, Stela 51, is shown.

No other city of the Old Empire displayed such consistent prodigality in the erection of its period markers as did Calakmul. Occasionally, at other cities, two monuments or even more were erected on the same period-ending, but at Calakmul it is safe to say that practically every *lahuntun* and *katun*-ending between 9.9.10.0.0 and 9.19.10.0.0 was commemorated by the erection of more than one monument.

While the sequence of the *hotun*, or 5-year period markers, is by no means as complete at Calakmul as it is either at Piedras Negras or at Quirigua, the number of stelae found at Calakmul (because several rather than one were regularly erected at the *lahuntun* and *katun* endings) is actually nearly two and a half times as large as the number of stelae found at Piedras Negras and nearly nine times as large as the number found at Quirigua. Provincial as the city seems to have been, judging from the art of its sculptured monuments, when it came to mass production, Calakmul may fairly be said to have surpassed every other city of the Maya civilization now known.

The Initial Series of Stela 43 surely reads 9.4.0.0.0, more than a century earlier than the next earliest date, 9.9.10.0.0, recorded on two different monuments—Stelae 28 and 29. However, the stylistic characteristics of Stela 43 are such as to indicate strongly that it had been executed at a much later date than 9.4.0.0.0, possibly as much as two centuries later. Further, the other dated monuments associated with Structure B, in front of which Stela 43 is located, all date from 9.13.10.0.0 (Stelae 38, 40 and 41), nearly two centuries later than 9.4.0.0.0. Finally, there are a number of Calendar Round dates in the inscription on Stela 43, which, although apparently without connecting

Secondary Series numbers, may be much later than 9.4.0.0.0—perhaps as late as 9.13.10.0.0—any one of which may record the dedicatory date of this monument.

Mr. Bolles found that the two principal mounds, Structures A and B (see map of the city), are about the same height, approximately 150 feet. However, since Structure A is built on somewhat higher ground than Structure B, the latter is in reality the higher as well as very much the larger, covering an area 425 feet square, compared to an area, roughly 250 feet square, covered by Structure A. Structure B also, judging from the dates of the monuments associated with it, is 30 years older than Structure A, having been dedicated in 9.13.10.0.0, whereas the seven stelae associated with Structure A were clearly dedicated on the *katun*-ending, 9.15.0.0.0.

The only building sufficiently preserved to permit the reconstruction of its ground plan is Structure C, of which Mr. Ruppert made a close architectural study and measured ground plan (see accompanying plan). This building is composed of two wings at right angles to the main middle section and it had originally twelve chambers and probably a roof comb.⁴

As Bolles was scouting through the forest with his gang of bush cutters opening the main lines of sight for the base map, he discovered many new monuments not found by Lundell. In fact, most of the 41 new stelae reported by the Calakmul expedition were found by Bolles in his exploration of the site incident to making the survey for the base map.

An interesting discovery was that of a large sculptured outcrop of limestone near the middle of a small plaza just

⁴ The roof-comb in Maya architecture, as its name implies, is a superstructure built on the roof of Maya buildings for decorative purposes.

west of the Ball Court. By chance, one of the lines of sight for the survey crossed this outcrop, which was completely covered with fallen leaves and humus soil save for a small section, perhaps three feet in diameter, lying directly in the line of clearing.

One of the workmen happened to notice that a human head of heroic size was carved in profile in deep relief—six inches—on the exposed upper face of



DATE GLYPHS ON STELA 89

A BEAUTIFULLY CARVED MONUMENT, FOUND ON THE SUMMIT OF STRUCTURE A, WHICH BEARS GLYPHS CORRESPONDING TO 471 A.D. OF OUR CHRONOLOGY.



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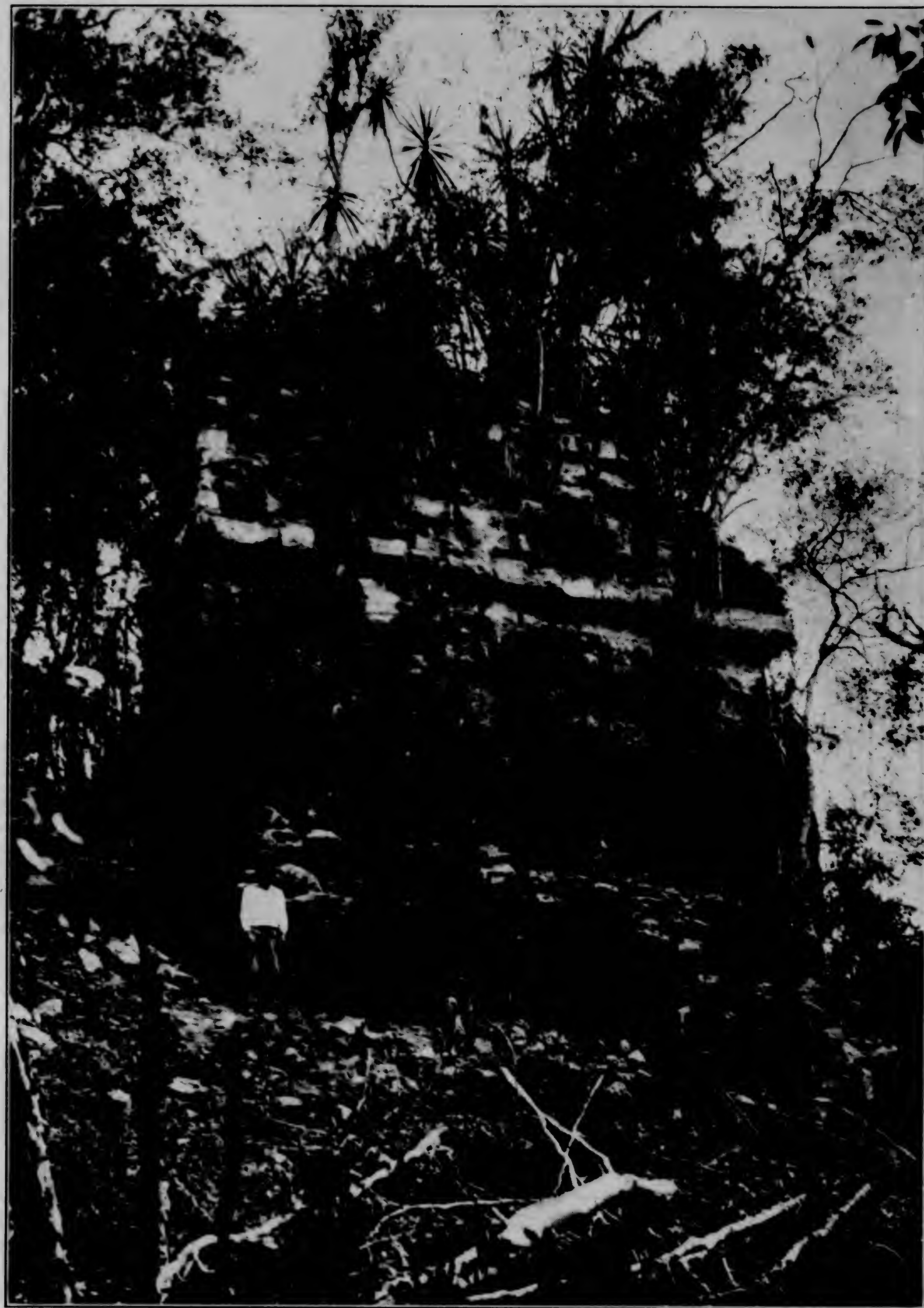
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STRUCTURE C, LOOKING NORTH

THIS IS THE ONLY STRUCTURE AT CALAKMUL SUFFICIENTLY PRESERVED TO PERMIT THE RECONSTRUCTION OF ITS GROUND PLAN. ORIGINALLY IT CONSISTED OF TWELVE CHAMBERS ARRANGED IN TWO WINGS AT RIGHT ANGLES TO THE MAIN MIDDLE SECTIONS (SEE GROUND PLAN).

this rock (see illustration). When this outcrop was finally cleared it was found to be an irregular oval, the long axis measuring 21 feet, the short axis, 17 feet.

The entire top of the outcrop was sculptured with six or seven nude human figures, the tallest being nine feet in height; all these had their arms bound behind their backs, the cords showing clearly. There are several glyph-panels scattered over the outcrop but, due to the fact that these had been exposed to a maximum of weathering as well as to the fact that their relief was much lower than that of the captive figures, the interior details of the signs had entirely disappeared.

Other carving on outcrops of living rock in the Maya area of similar character are: the sculptured toad on a projecting ledge of the native andesite on the south side of the Copan Valley in Honduras;⁵ the so-called Sacrificial Rock at Piedras Negras, Guatemala;⁶ and the stalking jaguar, sculptured on a flat outcrop of limestone at Chichen Itzá, Yucatan, Mexico.⁷ Mr. Stromsvik built a platform 17 feet above this sculptured rock at Calakmul, from which the design was photographed by flashlight at night.

Another find, possibly more significant scientifically, was Bolles' discovery of an ancient quarry a short distance north of the Main Plaza. Here two large blocks of stone, which, judging by their size and shape, probably had been intended for use as door lintels, are only partially quarried, one end and one narrow edge of each still remaining fast to the bed of limestone from which they were be-

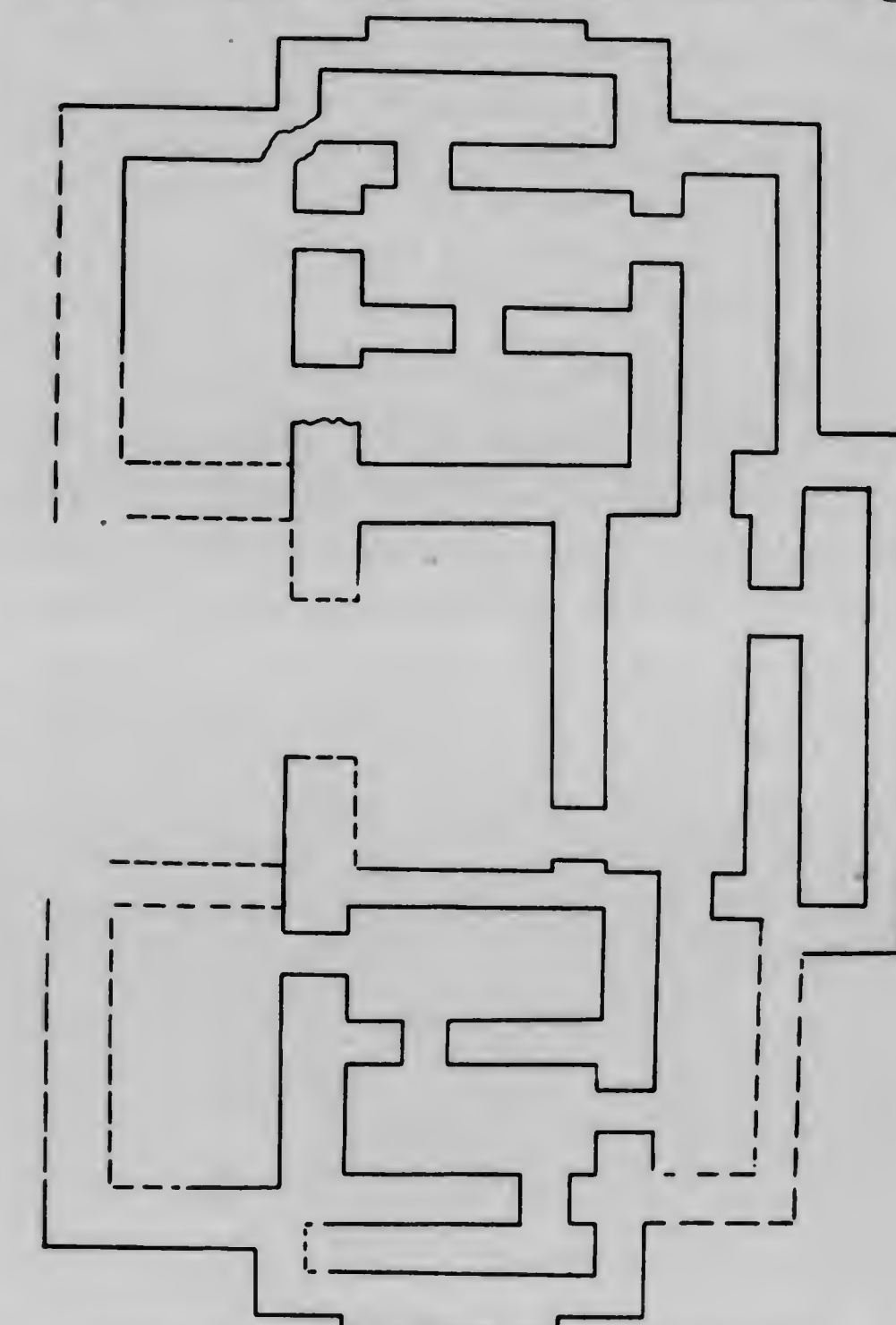
⁵ "The Inscriptions at Copan," Carnegie Institution of Washington, Pub. No. 219, by Sylvanus G. Morley, pp. 377, 378.

⁶ "Researches in the Central Part of the Usumatsintla Valley," Memoirs Peabody Museum, Harvard University, Vol. II, No. 1, by Theobert Maler, p. 42, and plate VII, No. 1.

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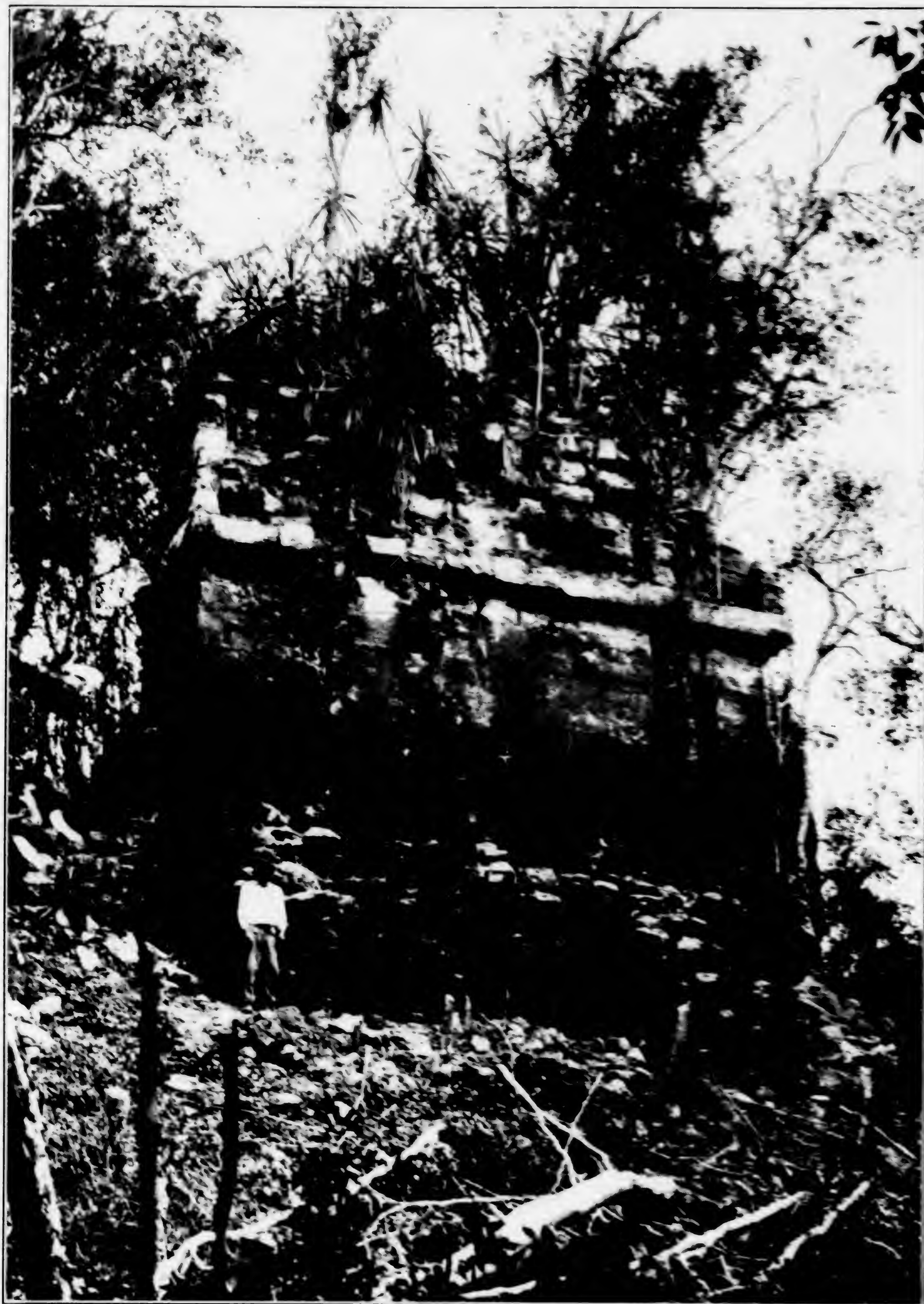
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GROUND PLAN OF STRUCTURE C.

to light. In fact, five ten-gallon gasoline boxes of fragments were brought back to Chichen Itzá, probably the largest collection of potsherds ever obtained from any Old Empire site. In addition to this work, Stromsvik was able to collect parts (sometimes the entire piece) of at least 15 different *metates*.

One of Ruppert's laborers reported having seen, two years before, a group of ruins some 15 to 18 miles by trail



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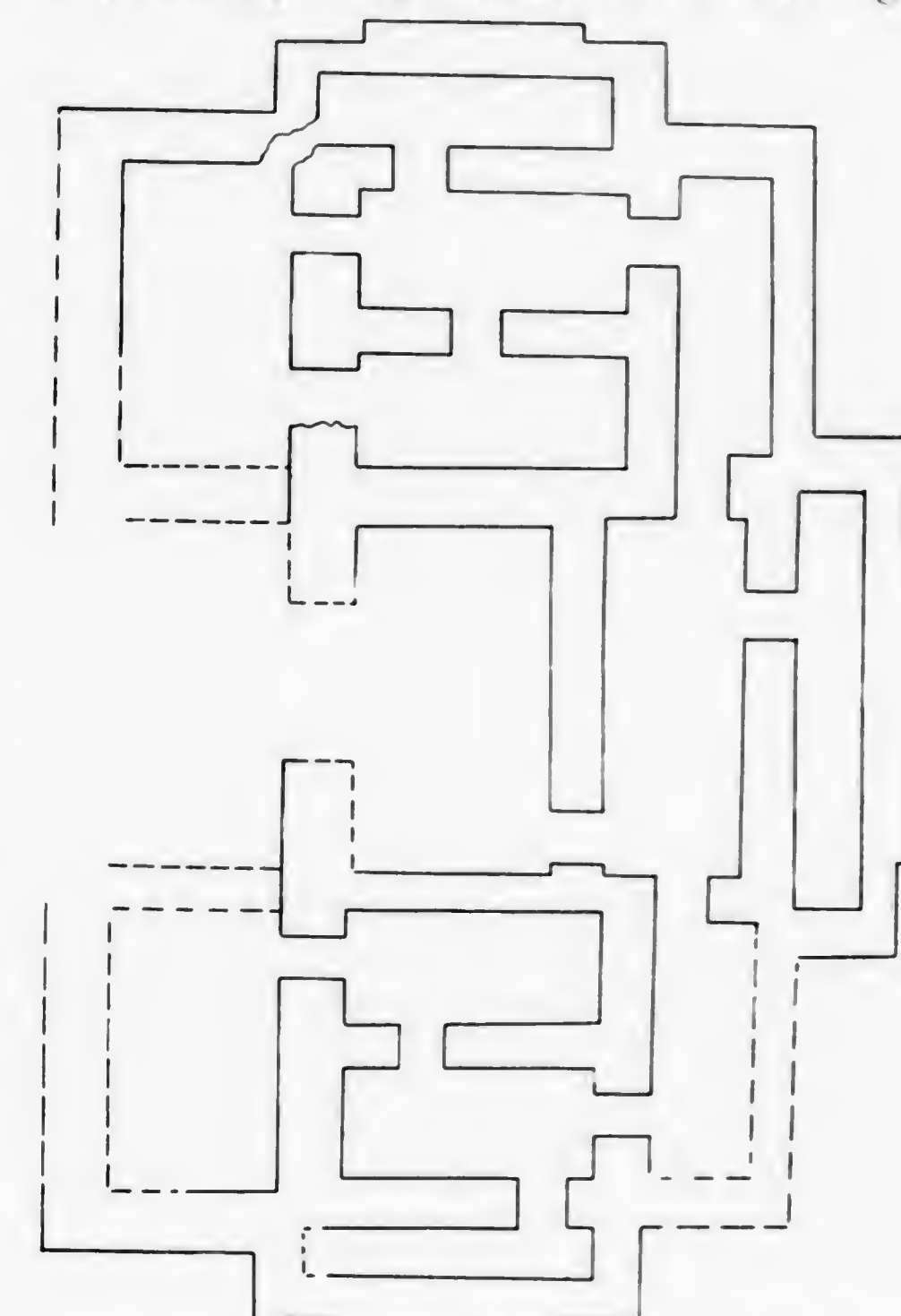
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SCULPTURED OUTCROP OF NATIVE LIMESTONE

SHOWING THE HEAD OF THE PRINCIPAL FIGURE. AN AREA 17 FEET BY 21 FEET IS COVERED WITH SEVEN CAPTIVE FIGURES REPRESENTED WITH ARMS BOUND BEHIND THEIR BACKS. THE LONGEST OF THESE MEASURES NINE FEET.

northeast of Central Buenfil near the former chicle camp of La Muneca. In addition to the usual mounds, pyramids and fallen structures, now overgrown by the forest, he stated that there were three carved stones like those at Calakmul, two standing and one fallen, with "letters" on them, "letters" being the general designation for hieroglyphics among *chicleros* throughout the Old Empire region. It was obvious that this informant was describing a site where there were at least three sculptured stone monuments.

Messrs. Ruppert and Bolles, having completed their work at Calakmul a day before the other members of the expedition were ready to leave, decided to pay a brief visit to the newly reported site near La Muneca. They left Calakmul on the morning of April 23, reaching Central Buenfil in time for an early lunch, then pushed on to the new site the same afternoon. In the dry season the nearest water to this site is four or five miles away and it was necessary for the party to make a dry camp.

That same afternoon Ruppert, while making a preliminary examination of the ruins, was stricken with his first attack of fever and obliged to take to his

hammock. The next morning, with great courage and fortitude, although still suffering from fever, he dragged himself about the ruins until ten o'clock, when he collapsed.

In spite of the very limited time available and Ruppert's serious illness an incredible amount of work was accomplished. In place of the three sculptured monuments reported by the *chiclero*, 23 monuments were found. The site, Bolles reports, is located on two large terraced platforms on either side of a small ravine. He had time to make a sketch map of only the western platform where the 23 stelae are located. A hasty exploration of the eastern platform, however, failed to bring to light any other monuments, though such may nevertheless be there, he believes.



OUTCROP OF NATIVE LIMESTONE TWENTY-ONE FEET LONG AND 15 FEET WIDE, ON WHICH APPEAR THE SCULPTURED FIGURES OF SIX PRISONERS. A PLATFORM WAS BUILT 17 FEET ABOVE THIS OUTCROP IN ORDER TO PHOTOGRAPH THE FIGURES.

Although neither member of the party is an epigrapher, they were both able to identify, in their very cursory examination of the monuments, at least four Initial Series, of which they deciphered the dates of three:

Stela	4	9.18. 0. 0. 0	530 A.D.
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"	16	10. 2. 0. 0. 0	610 A.D.
"	17	?	

The first records the same *katun*-ending as Stela 80 at Calakmul, and the second the same *katun*-ending as Stelae 15, 16 and 64 at Calakmul. Stela 16 at the new site records the date 10.2.0.0.0. This date is (1) 60 years later than the latest date at Calakmul; (2) 10 years earlier than the only surely deciphered date at Chichen Itzá; (3) 20 years earlier than the latest dated monument in the Old Empire region; and (4) 40 years later than the latest dated object from the Old Empire region.⁸

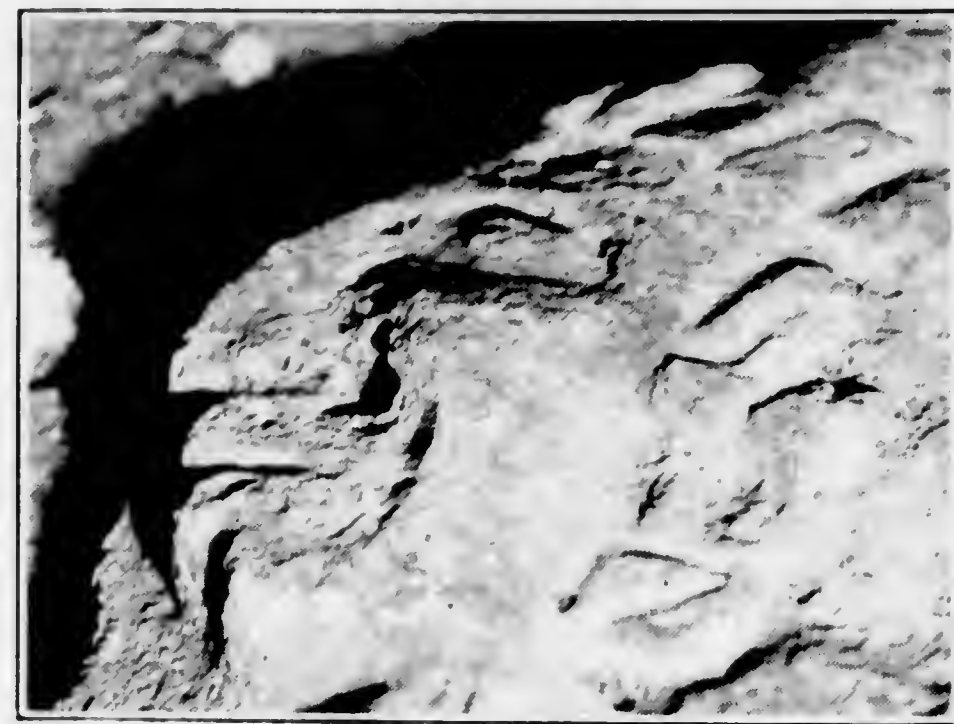
⁸This is a tubular jade bead found by Dr. Thomas Gann on the Rio Hondo in British Honduras in 1931. It records the date 10.4.0.0.12 *Ahau* 340 as Period-Ending.

The discovery of this late date on Stela 16 is perhaps the most important single contribution from this new site. It is another link in the ever-strengthening cultural chain binding the northern half of the Yucatan Peninsula to the southern half and indicates that the Old Empire came to its close, or at least to the close of monument building activities, some time during the first quarter of *Baktun* 10. Messrs. Ruppert and Bolles rejoined the rest of the expedition at Central Buenfil on the evening of April 24.

Early next morning a start was made by truck for La Gloria. A broken steering knuckle delayed the expedition 24 hours. Finally, at four o'clock on the afternoon of April 27, the expedition left La Gloria on two tram-cars for the fifty-mile ride to Kanasayab on the Champoton River, the head of navigation for motor-boats during the dry season, reaching there at four o'clock the next morning, where a motor-boat was waiting to carry the expedition and its outfit



AN ANCIENT QUARRY ON THE NORTHERN OUTSKIRTS OF THE CITY TWO BLOCKS OF STONE ARE HERE SHOWN IN COURSE OF BEING QUARRIED FROM AN OUTCROP OF THE NATIVE LIMESTONE OF THE REGION.



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LA GLORIA, CAMPECHE

ON THE ROUTE TRAVERSED BY THE CALAKMUL EXPEDITION. AT THIS POINT CHANGE WAS MADE FROM PLATFORM CARS DRAWN BY MULES TO A FIVE-TON MOTOR TRUCK WHICH CARRIED THE PARTY THROUGH THE HEART OF THE RAIN FOREST TO WITHIN A FEW MILES OF CALAKMUL.

to Champoton at the mouth of the river of the same name.

Here the expedition changed to a small schooner with auxiliary engine and proceeded by sea to Campeche. The Institution party, again most hospitably entertained by Mr. and Mrs. Brydon, left Campeche for Merida the next day. Messrs. Ruppert, Bolles and Stromsvik returned to Chichen Itzá, April 30, the writer and Mrs. Morley the next day, May 1, having been absent from Chichen Itzá just four weeks to the day.

Perhaps the greatest scientific contribution of the Calakmul expedition is the discovery of such a large and definitely Old Empire city having such a wealth of sculptured monuments so far north as the southern part of the state of Campeche. Previous expeditions, also working from the north, had found in central Campeche sites more characteristic of the New Empire cities of the north than of the Old Empire cities of the south. The discovery of Calakmul, with a definite Old Empire flavor, both in its architecture as well as in its sculptured

monuments, at the very heart of the Yucatan Peninsula, midway between the earlier cities of northern Guatemala (the Old Maya Empire) and the later cities of northern Yucatan (the New Maya Empire), fills a geographic blind spot in our picture of Maya civilization and satisfactorily bridges the gap between the two regions.

A number of other archeological sites described as having sculptured monuments, located in the same general region as Calakmul, not only in southern Campeche but also across the line in the northern part of the Department of Peten, Guatemala, hitherto unvisited by scientific expeditions, were reported to the writer and it is planned to send another expedition into this new archeological sub-province during the next field season (1933). Indeed, perhaps the most important immediate result of the Calakmul expedition may be said to be the opening up, the first general notice, so to speak, of this scientifically significant region, the no-man's-land between the Old and New Maya Empires.



LA GLORIA, CAMPECHE

ON THE ROUTE TRAVERSED BY THE CALAKMUL EXPEDITION. AT THIS POINT CHANGE WAS MADE FROM PLATFORM CARS DRAWN BY MULES TO A FIVE-TON MOTOR TRUCK WHICH CARRIED THE PARTY THROUGH THE HEART OF THE RAIN FOREST TO WITHIN A FEW MILES OF CALAKMUL.

to Champoton at the mouth of the river of the same name.

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Retake of Preceding Frame

ARCHAEOLOGY

Mayan Diggings Shed Light On America's First Calendar

Monument Unearthed in Mexico is Dated in Short Style Previously Thought To Be Comparatively Recent Method

A MONUMENT unearthed in tropical Mexico is, from first reports, evidence that brilliant Mayan Indians actually invented a short-cut system of writing dates in the New World before the birth of Christ. The monument, dated in the concise manner, is apparently strong confirmation that the small Tuxtla statuette of jade, dated in the short-cut system and treasured in the U. S. National Museum, is what archaeologists have hoped it was—the oldest known object dated by the Mayas.

The Tuxtla statuette, a figure of a priest in penguin regalia, bears the date May 16, 98 B. C., according to reading by Dr. H. J. Spinden of the Brooklyn Museum, and authority on the Mayan calendar. But some archaeologists have doubted that Mayas living in the century before Christ wrote the date on the image. They believed the style of short-cut date writing was a later Mayan invention, and therefore probably some Maya of comparatively late centuries inscribed the statuette, much as we might set correct dates on a statue of Ben Franklin.

The dated monument, solving the Tuxtla statuette mystery, has come to light not far from Tuxtla, at Tres Zapotes, in the state of Vera Cruz, southern Mexico. A joint expedition of the Smithsonian Institution and the National Geographic Society is exploring this site, which proves to be the most far western settlement of Mayan Indians ever found. It lies fully 100 miles west of the known Mayan zone of civilization.

Not Translated

The monument dated in the fashion of the Tuxtla statuette has not yet been fully translated into terms of our calendar. But Matthew W. Stirling, Smithsonian archaeologist and director of the field work, has concluded that it was erected early, not late, in Mayan times, thereby removing reason to doubt the great antiquity of the Tuxtla statuette. Mr. Stirling has called for consultation of Mexican and American archaeologists at the site, in view of importance of the

monument. Many archaeologists have heretofore been inclined to consider Mayan inscriptions old if dates were written in long style, and not so old if written in short style.

One archaeologist explains the Mayan date systems this way: Early Mayas wrote out cycle, day, and month as we might write "March the first, Anno Domini nineteen hundred thirty nine." Later Mayas recognized a date by position of signs, as we easily read "3-1-1939." An early monument dated in short style upsets this idea of early and late ways of ancient American dating.

Settle Old Problems

With this stone's inscription deciphered, American scholars may settle old theories as to how, and when, Mayan Indians moved over tropical America in their destiny of building the New World's greatest native civilization. Imagine archaeologists of the future arguing over the United States, and unable to decide whether the country was occupied all at one time, or whether New York and San Francisco represented different eras, centuries apart! But that is the sort of puzzle regarding what went on in the New World in centuries before, and after, the time of Christ, which has delayed complete understanding of the amazing Mayan civilization which covered 175,000 square miles in the tropics.

The stone clew is apparently one of the date markers that Mayas set up. For some 1,500 years, these methodical Indians raised such stones every 20 years, and in their big cities even at five or ten year intervals. It is by deciphering these mileposts of time that archaeologists have trailed Mayan progress in Guatemala, Honduras, southern Mexico and Yucatan.

Discovery of the monument and ruins of a Mayan settlement so far west in Mexico is pronounced "exciting" by Dr. Spinden, who is awaiting final word as to whether the far west settlement proves early or late in Mayan history.

If it is early, as first reports indicate,

Modern Mayas: A People in Transition

THE Mayas of ancient days built in Yucatan and Guatemala one of the world's greatest older civilizations, and though it was tottering when the Spanish conquerors came and ended officially thereafter, the Mayas themselves are not extinct. They are in fact a very live people; hundreds of thousands of them are living to-day in Yucatan.

Even the Maya language, probably not very different from that spoken by the builders of ancient Coba and Uxmal, is spoken; it is in fact the chief means of communication outside of Merida, the modern capital of the present Mexican State of Yucatan. Speeches in the language that once uttered magical incantations for strange New World gods are now heard on the subject of socialism and the reasons for the economic depression.

No Deterioration

Two weeks ago in Washington the Guatemalan minister, Señor Dr. Don Adrian Recinos, formally opened an exhibition in the Smithsonian Institution of Maya fabrics and tools of present-day manufacture—objects which probably do not differ essentially from those of 500 years ago. The collection shows clearly that the culture of the modern Mayas has deteriorated very little during the centuries since their greatness. They still turn out gold filigree work that would be creditable to the finest European goldsmiths of any age. They weave cotton fabrics on the old-style Maya handlooms with beautiful intermixtures of colors in elaborate designs. They dye their yarns,

in a curious process of evolution, passing from the old tribal customs through many intermediate stages into a state resembling the more advanced and cosmopolitan civilization found at Merida.

The steps by which an ancient people adjust themselves to new ideas and new ways emanating from what is called "Western civilization" is perennially interesting to anthropologists. Dr. Redfield, who recently related some of the results of his work in *The Scientific Monthly*, found study of the Mayas particularly illuminating because villages and tribal groups are to be found in practically all stages from the most primitive, in the southern regions of Yucatan, to enlightened groups living at or near the capital of the State.

A community about halfway between these stages is Chan Kom, situated not far from the archeological site of Chichen Itza. In this village all practical activities are closely associated with magical and religious observances. These, in turn, are curiously compounded of simplified Christian rituals and the pagan religion practised by the ancient temple-building Mayas.

Native priests or shamans preside over the rituals. Offerings must be given at the planting and harvesting of corn. Sacred breads are made and dedicated.

These superstitious remnants of the past are inextricably mingled in the village with modern ideas and ways. There is a school



Courtesy of Dr. Robert Redfield and *The Scientific Monthly*

Maya children of to-day studying at their school in Chan Kom

where Spanish and reading and writing are taught. A modern medical clinic has been established by the Carnegie Institution at Chichen Itza and Maya natives may be treated there if they wish it. Plans are afoot to establish a cattle-raising cooperative organization. The advantages of domestic hygiene are discussed in village powwows. A road is being built to connect the village with a railroad and the tourist trade.

A New Device to Permit Voting by Radio

Every normal radio listener at some time or other has wanted a device on his set that would enable him to tell the radio stations just what he thought of their programs. An important step in that direction has been taken by Dr. Nevil Monroe Hopkins, lecturer on engineering at New York University, in the invention of a simple apparatus that permits what he calls "radio-voting."

The device, which Dr. Hopkins believes can be manufactured to sell for \$1, is about the size of a cigar box, and can be attached to any radio operating from a city powerline. It contains three buttons, one marked "present," and the others "yes" and "no."

When any of these buttons are pressed, a small synchronous electric clock is started. This clock keeps running until a predetermined time, say two o'clock in the morning, when the load at most powerhouses is at its lowest and steadiest of the day. At the predetermined moment all the clocks actuated by the "yes" buttons of thousands of sets give a momentary signal, such as flashing on an electric bulb. The sudden load of all these signals is recorded at the powerhouse. A few minutes later the electric clocks actuated by the "no" buttons give a signal.

The approximate number of "votes" on each side of the question can be calculated by dividing the sudden powerhouse load by the amount of electricity needed for each individual set signal. The number of votes for and the number against the question can be obtained with considerable accuracy, Dr. Hopkins said, and the results, gathered up in all the powerhouses in the broadcast area, may be transmitted automatically to the radio station.

To a layman it would appear that a single householder, arising and turning on his house lights at the critical moment, could cast a million votes, but Dr. Hopkins believes that with proper apparatus this method of stuffing the ballot box can be prevented.

At its best, the device doesn't permit a personal expression of approval or disapproval of programs or personnel. However, it may make possible the casting of straw votes on public questions, on the popularity of programs and other such matters. For instance, a speaker can learn at the end of his program approximately how many listeners he had by asking them to push the "present" button. He can find out the thought of it by asking them to push the "yes" or "no" button.



Courtesy of Dr. Robert Redfield and *The Scientific Monthly*

Modern Mayas—the shaman at the right is performing a ceremony to drive away disease

as did their ancestors, with vegetable dyes. Prominent among the figures woven into their work is the design of the quetzal, sacred bird of ancient Guatemala.

It is not as a disappearing remnant of a once-great people that we must think of the Mayas, either. Dr. Robert Redfield, a University of Chicago anthropologist who has passed much time in Yucatan studying the Mayas, says they are not destined to extinction but are to become one part of modern civilization. The Mayas are to-day

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64. SCULPTURED REBUSES

ZELIA NUTTALL

The Ancient Mexican picture-writing or method of recording words and names by means of rebuses. (Examples) Reliable testimony establishing that each Mexican deity was popularly known by several names or titles descriptive of one or more of his or her attributes, just as, in the Catholic rosary, the Virgin is invoked with different figures of speech. Early Spanish writers on Mexico warned against the usual interpretation of such varying titles as separate names of different deities which has given rise to the erroneous and confusing multiplication of Mexican gods and goddesses which is still in progress.

Examples of a few stone monuments and their interpretations as rebuses. The Mexican and Maya employment of an ingenious, artificial method of adding affixes to numerals in order to convey in a cursive way, what was being counted.

Comparisons between the Mexican and Maya numerical affixes and their respective uses.

Conclusions.

SCIENCE NEWS--DEC. 1928

102. NOTES ON THE UNSPECIALIZED CULTURES OF MIDDLE AMERICA

GEORGE C. VAILLANT

The material grouped under the name "Archaic" is not unified nor is it primitive. In the Valley of Mexico alone there are two phases that are readily distinguishable, one seemingly connected with the sub-lava finds at Copilco, San Angel, the other with material associated with pyramids in the state of Puebla.

Vaguely related only to the Mexican cultures, are the early finds of San Salvador, and at the Finca Arevalo in Guatemala.

Two groups of material have been found at Maya sites under early conditions. These forms differ again from each other although remotely resembling early forms.

From Vera Cruz and Puebla in the north extending certainly so far south as Costa Rica are a variety of forms that resemble neither the so-called Archaic families nor yet the ceramics of the specialized or named cultures. This wave is hard to place in time, but may well have originated in a single place.

Before the rise of the Maya and other cultures we of necessity have many years of high culture. We must therefore be willing to take hold and develop a historical scheme for this little studied epoch.

The Native Calendar of Central America and Mexico. By Dr. Daniel G. Brinton. Philadelphia, 1893, pp. 59, 8vo.

As Dr. Brinton announced to the public, in his introduction to the "Annals of the Cakchiquels," that he "proposed in a future work to discuss the methods of reckoning time in use in Central America," we presume the work with the above title, which has just appeared, is the fulfillment of that promise.

Dr. Brinton is better equipped with material for this investigation than any other person, and his work was received with the hope that we should find therein the solution of some of the troublesome problems relating to this Calendar. Although, like all his works, the book contains much that is valuable and interesting, a careful examination results almost in a feeling of disappointment. It is probable that he and Dr. Seler have together made the most that is possible out of the linguistic and historical materials; if so, we are forced to the conclusion that the solution will only be reached when further advance has been made in the interpretation of the hieroglyphic writing, a branch of the subject upon which Dr. Brinton does not enter.

The scope of the work, which is based chiefly on linguistic material, may be indicated by the following headings: "Geographical extension of the Calendar system; Mathematical basis of the Calendar; Where did it originate; Analysis of the day and month names; Symbolism of the day names; and General symbolic significance of the Calendar."

In his explanation of the names of the days he follows substantially the same method of reasoning as that adopted by Dr. Seler in his paper on the same subject, though the conclusion reached in reference to the individual names is not always the same. However, they agree in concluding that the corresponding names of the different calendars were intended to express substantially the same idea; hence that they had a common origin. This conclusion appears to be justified as to a majority of the names; but the relation in some cases is made out by apparently circuitous interpretations.

It seems rather singular that Dr. Brinton, who is inclined to the belief that the Calendar originated with the "ancient branch of the Mayan stock, who inhabited the present states of Chiapas and Tabasco," should be so largely influenced in his definition

two languages that preceded us, and two names, whereof the one we hear was ratified by the sacrament of Christian baptism, while the other, whereby he goes among his own, was sealed upon his infant lips with the spittle of a swart godfather at a pagan feast." Poverty, he argues, is quite unknown to the Pueblos, for these villagers own silver, coral, and turquoise ornaments alone to the value of \$100,000.

In "The City in the Sky" he describes Acoma, probably the only pueblo of New Mexico standing on the site it occupied when the Spaniards first found their way into New Mexico. In a chapter on the "Penitent Brothers" he tells of the New Mexican offspring of an old Spanish Franciscan order whose members resort to self-flagellation and even crucifixion for penance, and although both church and state have endeavored to abolish this survival of the order, they still maintain their fanatic practices. Some of the performances of the Penitentes have been witnessed and photographed by Mr. Lummis.

"The Chase of the Chongo" describes the ceremonial game of the kicked stick; the "Wanderings of Cochiti" relates in a thoroughly interesting way the successive shiftings of the Queres inhabitants of Cochiti before Coronado came in the middle of the sixteenth century.

The Southwestern nomad is allotted two chapters: "The Apache Warrior" and "On the Trail of the Renegades." None of the papers will prove of greater interest to the folk-lorist than the chapter on New Mexican folk-songs.

Each Pueblo has its patron saint in the Catholic church, to whose honor the appropriate day of the calendar is set apart for the performance of ceremonies "contrived to do homage to the *santo* and to all the pagan Trues at one fell swoop." Chapter X, "A Day with the Saints," describes their ceremonies as witnessed by the author at various pueblos. The concluding article, "The Cities That Were Forgotten," is probably still fresh in the minds of many of the readers of *Scribner's*, and we are pleased to see it here in more permanent form. In this chapter the myth of the "Gran Quivira," which Bandelier has so completely exploded, is carefully and accurately related.

Altogether the volume, from the popular point of view, is the best that has yet been published on our Southwest. It is beautifully printed, and its numerous excellent illustrations are from photographs by the author.

F. W. HODGE.

of the Maya names by the signification of the Zapotec and Nahuatl names. This, however, is probably due to the fact that the signification of the latter is better known than that of the former.

In one or two places where reference is made to Dr. Seler's opinions, they do not appear to be correctly given. Under the "Fifth Day," *Chicchan*, he states that "Dr. Seler says that 'undoubtedly' it means 'a sign marked [mark?] or taken [token?].'" To give this sense it would have to be read *chech*." Yet this author in his paper* derives the name from *Can*, "serpent," and *Chi*, *Chii*, "mouth, to bite," thus interpreting the day name by "biting serpent." We may also remark that Henderson (MS. *Lexicon*) gives *Chicul*, "sign, mark, ceremony, token;" and as a verb, "to mark, show, sign."

Under the "Ninth Day," *Muluc*, he refers to the same author as follows: "The Tzentel and Maya *Mulu* and *Muluc* are from the radical *mul*, to heap up, to pile up; which evidently cannot refer to the 'gathering together of waters,' as Dr. Seler suggests, but rather to the heaping up of the clouds in the sky." Dr. Seler does suggest that we may conceive here the idea of a "gathering of waters," but it is evident from what follows that he alludes to the gathering in the heavens, from which the rain descends, which is precisely the same idea as that suggested by Dr. Brinton.

The analysis of the month names is brief, and, so far as it relates to those of the Maya Calendar, is based upon the theory that they refer chiefly to the religious ceremonies and festivals observed at certain seasons. While it is true that they are radically different from those in use among other tribes of this stock, it is doubtful whether the method of their derivation could have been so totally different from that by which the names of the months of other calendars were obtained, as this theory implies. The names of the latter, in regard to which Dr. Brinton furnishes some new and valuable data, appear to refer to certain natural phenomena, agricultural operations, the seasons when certain animals are most plentiful, when certain flowers bloom or fruits ripen, etc. This is precisely what we should expect, and hence hesitate to accept a theory of wide

* *Zeitsch. für Ethn.*, 1888, Heft 2.

variation in one of the tribes without stronger evidence. From the study of the month symbols found in the Dresden Codex, I am inclined to believe their interpretation will show that the Maya month names have been derived, as a rule, in the same way as those of other tribes.

It is to be regretted that the author has failed to give us the evidence on which he bases his conclusion that the Quiche-Cakchiquel calendar followed the four-year system, having four "year-bearers" as the other calendars. If, as he has shown us in the "Annals," "every year ends on a day, *Ah*," it would seem impossible, if the days followed one another in proper order, that the years could begin with different days; nor will the fact that the closing day was numerically three less than that of the preceding aid in the adjustment.

The closing section of the paper brings clearly before us the goal which the author strives to reach, and leaves the inference that his analyses, as we would naturally expect, have been influenced to some extent by his theory of the scope and object of the calendar system. This theory he briefly summarizes as follows: "That it was intended to cover the career of human life from the time of birth until death at an old age;" in other words, that it is an outlining or symbolic representation of the twenty steps into which Dr. Brinton conceives the natives arranged the single human life. "In the twenty headings under which the agencies which influence human life were arranged, the ancient seers believed," etc., are the words with which he begins his final paragraph.

Our thanks are due to Dr. Brinton for this contribution to the subject of the "Native Calendar" of Mexican and Central American tribes, but we are forced to the conclusion that more material progress in the solution of the problem will not be made until the written characters and time symbols have been deciphered.

NOTE.—I think it possible the calendar may yet be traced to Polynesia. There is strong evidence pointing that way.

CYRUS THOMAS.

ORIGIN OF THE MAYA CALENDAR

THE simple method by which ancient wise men of tropical America observed the sun and were able to tell their people when to plant crops has been discovered by Mrs. Zelia Nuttall, a well-known authority on Mexican archeology. Mrs. Nuttall, who has spent over thirty years studying the antiquities and early history of ancient Mexico, is now in this city, where she explained her theory to the American Anthropological Association. On their arrival in the New World the Spaniards were surprised to find that the natives had an accurate knowledge of the length of the solar year. This remarkable fact has hitherto been explained as an indication that early astronomer priests, even in primitive communities, must have made careful observations of the sun and must have gradually worked out a system of calculating and recording the average number of days between the longest and shortest days in the year. Mrs. Nuttall found that such difficult, complicated and sustained mental efforts were not necessary nor probable.

"All the centers of ancient American culture," she explains, "are situated within the tropics. In this zone the sun passes twice a year through the zenith,

the result being that twice a year at noon there occurred the momentary striking phenomenon of all vertical objects casting no shadow.

"Archeological and documentary evidence establish beyond doubt that the Mexican, Maya, Peruvians, Ecuadorians and others inhabiting the tropical zone observed the periodical strange and momentary disappearance of shadows and interpreted it as 'a descent of the Sun-God.'

"This 'descent of the god' was of outstanding importance to the primitive farmers, because it was always accompanied by rains, caused by the heat of the vertical solar rays. The priests or wise men who observed the 'descent of the god' could thus safely assure the people that the time was ready for them to sow the seeds of maize and other food plants."

The first means by which the solar phenomenon could have been noted were plain vertical posts or upright stones. But later, Mrs. Nuttall believes, the people began to feel that more worthy places of rest should be provided for the descending Sun-God. Sun-pillars, stelae, stone seats, altars, towers, and even shrines and temples were set up to celebrate this great and mysterious phenomenon, and in time an elaborate ceremonial was developed, which included the offering of blood and sacrifice of human victims.

In the light of this discovery, ancient American religions, art and calendars take on new aspects. The Sun-God, who is so widely depicted in the Mexican Codices and bas-reliefs and on Maya temples with his heels in the air and his head far below them, has generally been termed "the diving god." According to Mrs. Nuttall's interpretation of these figures, the god is descending through the air and the feather-like decorations on his arms are symbolical like the wings with which angels are represented in Christian art. Many of the carved and painted representations of the Sun-God in the form of a human being, bird or jaguar, show him accompanied by plumed serpents which symbolize the rains from heaven associated with him.

Maya History

Ceramics

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PURPOSE OF CARNEGIE INSTITUTION
AS STATED IN ITS CHARTER

~~for publication, and that the modern positions had then to be compared with earlier observations through lengthy computations to arrive at accurate positions and motions.~~

~~As for the promise of usefulness, some idea can be formed through the success of a preliminary publication of the positions and motions of about 6,000 stars, which has formed the basis for literally hundreds of important investigations. The more extensive catalogue should prove an even more effective agency in our studies of the history of the universe.~~

~~The international body of astronomers has already adopted the positions to be furnished in this General Catalogue as the basis upon which to found the photographic positions of fainter stars.~~

6. Ceramics and Maya History

The archæologist, in the absence of written records, is concerned with reconstructing the story of a civilization's past from the material things, made by hand, which that civilization has left behind. Ruined buildings, stone objects and pottery must serve the archæologist as written records serve the historian. These materials in themselves are of little value in understanding the growth of culture and for interpretation of historical events unless they can be arranged in their proper time sequence. The materials chosen must be those which accurately reflect cultural changes, whose chronological position can be readily determined, which are relatively abundant and well preserved. Pottery ideally fullfills these requirements. The reason for this lies in the nature of the potter's product.

Once the art of pottery-making is adopted by a people it becomes as intimately connected with their life as the raising and gathering of food. Pottery vessels are quickly and rapidly made, and find use in every household for the cooking and storage of food. Innate human conservatism, in an art so commonly practiced, tends to develop a uniformity in the form and decoration of the product. This permits of but little individual expression on the part of the potter and produces a strong similarity in the pottery from any single town or village. Changes

ocean tides. There is, however, some correlation between velocity and the tide-raising forces of the sun and moon, since the variation appears to have the same period as that of the spring and neap tides.

Thus, in spite of the most painstaking experimental investigation, it is not possible to give an estimate of the velocity of light which has not an uncertainty of 0.005 per cent of its value. The mean rounded value of all the readings is 299,775 kilometers per second.

5. The Positions of Thirty-three Thousand Stars

Astronomical research may be said to aim at two general objectives, the description of the life history of the universe surrounding us, and the description of the life history of the individual star. We have long known that precise study of the motions of the stars is important in attaining both objectives, and recent developments have emphasized the fact that, while exploratory work may be performed by other agencies, in the end we must rely upon the motions of the stars for an accurate picturization of our universe.

About the beginning of this century, Professor Lewis Boss, realizing the important contributions which the motions of the stars might be expected to furnish and conceiving that the time had arrived when it was practicable to determine these motions, laid plans which a few years later developed into the Department of Meridian Astrometry.

Starting with a program which originally called for the calculation of the positions and motions of 20,000 stars, the project was extended to include 33,000. This project is now almost completed.

The charts show the distribution over the sky of the stars which will form the General Catalogue of the positions and motions of the 33,000 stars. Some idea of the magnitude of the undertaking may be obtained from the heavily starred charts, keeping in mind that years of observation were necessary for the determination of modern positions of these stars, that ~~lengthy computations are necessary to prepare the observations~~

in styles or fashions of decoration are always uniformly reflected in the pottery of any given period. This not only holds true for the pottery produced in a particular village but also tends to produce generic resemblances in the pottery of a region or area.

The tendency of a village to cling to certain fundamental characteristics in its ceramic products may be so strong that these characteristics are retained in spite of migrations or the influence of foreign peoples. This tendency may be so highly developed that even when a people has been conquered and forced to change every other aspect of its culture it will continue to make the same type of pottery as of old.

Primitive man engaged in extensive trade and among the most frequently traded objects were those made of clay. Because of the individual characteristics of the pottery in various villages, regions, or areas, it is possible to identify those vessels which were traded and in most cases to tell their source.

Ceramic vessels while easily made were even more easily broken. The fragments were thrown on the village refuse dump. During the years a village site was occupied, the refuse heaps continued to grow and to record the types of pottery used. From a study of the arrangement of the layers, or strata, of these beds of rubbish and the fragments of pottery, or potsherds, they contain it is possible to arrange all of the pottery from that site in its proper chronological position. From a knowledge of the sequence of the types of pottery it is but a step to correlate with the potsherds the other materials of village life thrown on the rubbish heap and to arrange the whole series in its proper historical sequence.

From the study of the pottery of any people it should, then, be possible to learn a great deal about their historical development. The sequence of culture periods at Chichen Itzá in Yucatan and at Uaxactun in Guatemala have been outlined through a study of the pottery found at these two sites. Continuation of these studies may be expected to suggest answers to such problems as tribal movements, trade with contemporary peoples, the influence exerted through external contacts, and even minor oscillations of culture within a definite period.

7. The Yaxuná-Cobá Causeway

About 12 miles south-southwest of Chichen Itzá lie the ruins of Yaxuná, a much smaller and, architecturally, less important site. From one of the small pyramids of Yaxuná a broad causeway, 30 feet wide, starts eastward into the bush.

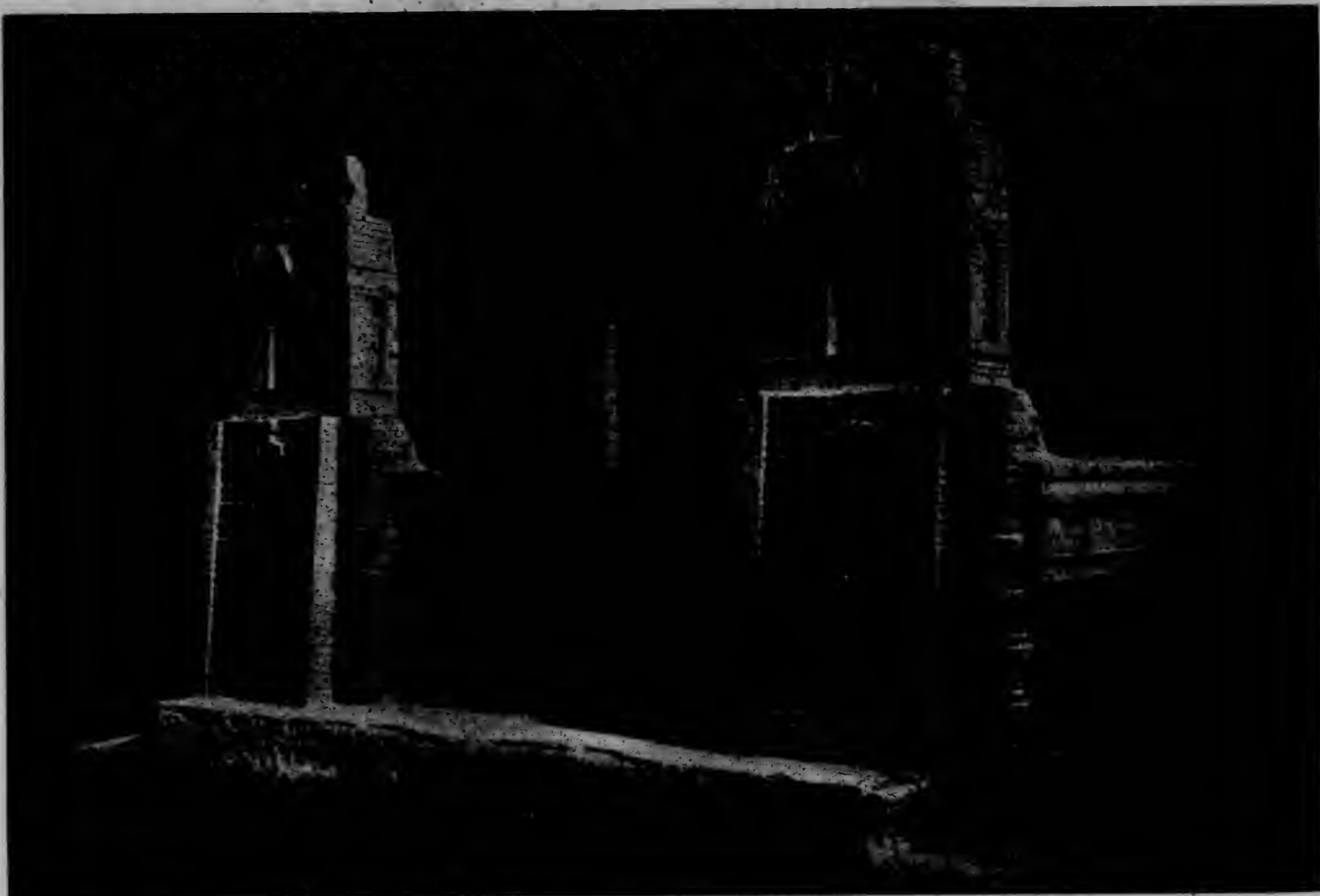
About 55 miles east-southeast of Chichen Itzá, clustered around five lakes, lies the very large, ancient city of Cobá, which has been studied and mapped by Carnegie Institution Expeditions during the past eight years. From in front of one of the principal temples at Cobá a broad causeway, also 30 feet wide, starts westward into the bush.

It had long been assumed by the Institution archæologists that these two causeways were, in reality, one and the same highway, connecting Cobá with Yaxuná, but this hypothesis had never been proved by an actual survey from one city through to the other.

Verification of the point was of considerable archæological importance since, if this causeway should be found to connect Cobá with Yaxuná, which latter site, as already noted, is much smaller and architecturally seems to be less significant than Chichen Itzá, then the conclusion would be almost inevitable that, at the time the causeway was built, Yaxuná was much larger than Chichen Itzá, and was probably the most important city in the region immediately west of Cobá. If this fact could be established it would follow that Yaxuná represents a still earlier chapter in Maya History than that which the Institution has been studying at Chichen Itzá, a step nearer the beginning of the Maya story in the northern part of the Yucatan Peninsula.

On February 12th of this year, Alfonso Villa of the Institution's staff in Yucatan, with twelve Maya Indians from the neighboring village of Chankom as laborers, began the survey of this causeway, which was completed three weeks later at Cobá, where the highway was found to end as suspected.

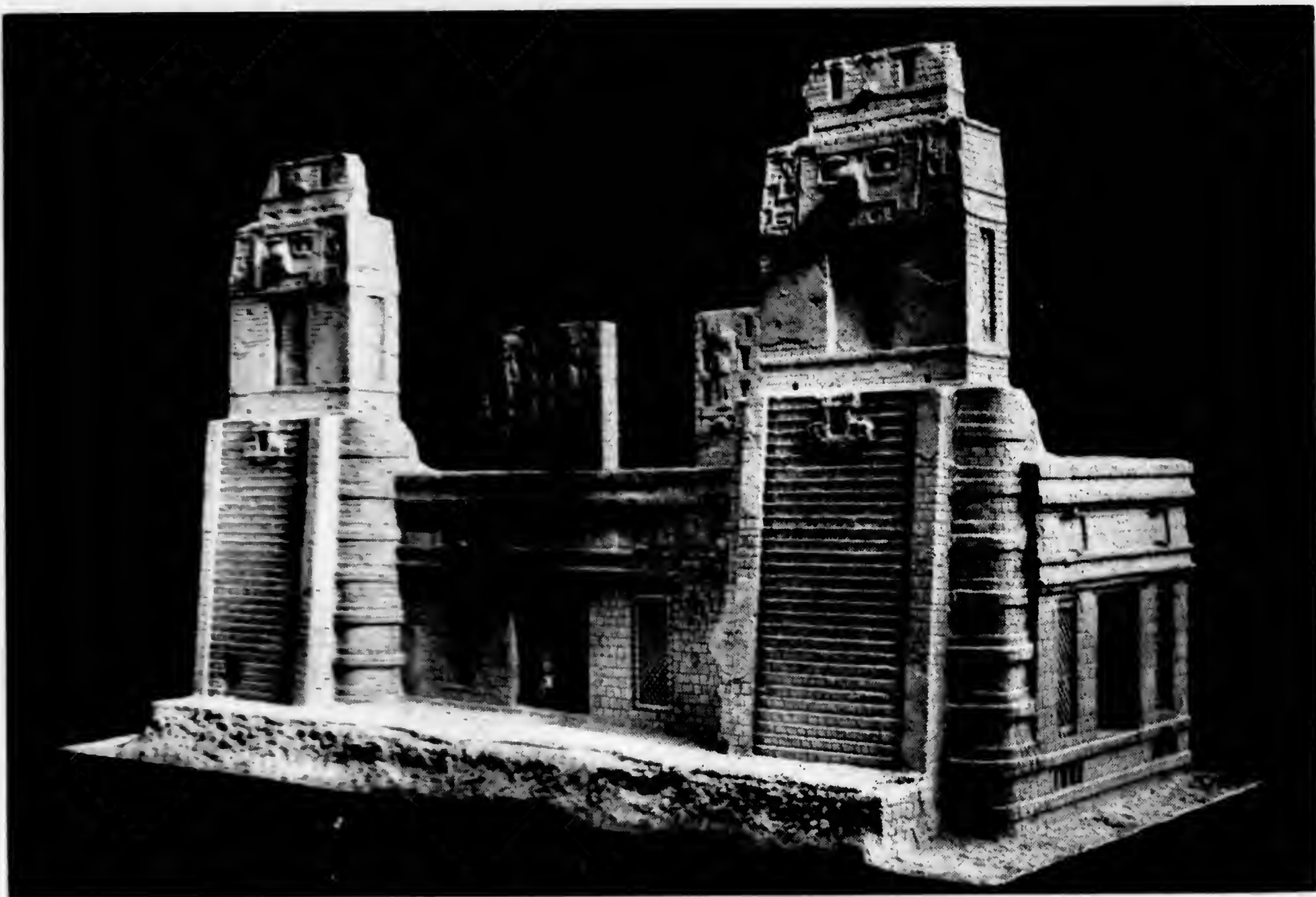
The causeway measures 100.38 kilometers (62½ miles) from end to end, changing its direction five times, though never varying more than 15° from north or south of due east. The longest stretch without change of direction is 24 miles. There are no branching roads, though numbers of smaller settlements were found along its sides.



LOST IN THE JUNGLE

This model shows the public a beautiful Mayan temple which one lucky scientific expedition "ran into" and which the two explorers fortunately photographed and studied then and there. No expedition has ever again found these ruins guarded by tangled vines and bush. The model is the work of Shoichi Ichikawa of the American Museum of Natural History, under supervision of Dr. George C. Vaillant and Clarence L. Hay.

Sci. News, May 18, 1936.



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Sci. News, May 11, 1924

Retake of Preceding Frame

LINGUISTICS

New Research Promises To Solve Maya Writing System

Hieroglyphics Stand For Sounds, Says Harvard Worker, As He Translates Text Abandoned by Most Scholars

PERSISTENT efforts of scholars to decipher the strange picture writing system of the Mayan Indians of Yucatan will at last be rewarded, it appears from a report by Benjamin Lee Whorf, just published by the Peabody Museum of Harvard University.

For years archaeologists have pored over the stone monuments and the books that hold the written records of America's highest ancient civilization. The Mayan Indians had many books in their priestly and astronomical libraries, but when the Spaniards conquered Mexico, missionary zeal made huge bonfires of the heathen picture books, and only three Mayan books survived.

Modern scholars, studying these books and the numerous stone-carved inscriptions in ruined Mayan cities, were successful to the extent that they learned to read the signs that represented dates and astronomical calculations. This was more of an achievement than the bare statement would suggest for most of the inscribed monuments dealt with these matters. The students of Mayan writing also succeeded in recognizing some of the picture signs that represented Indian gods, and other symbols. But hope of understanding the system on which the writing was based has grown dim in recent years.

On Phonetic Principles

Now, Mr. Whorf has announced that the system of writing evolved by the Mayan Indians was based on phonetic principles. That is, hieroglyphics were used to stand for sounds in the language. This is a view which early students of the Mayas advanced, but which has been almost entirely neglected for forty years.

As far back as conquest days, Mexico's most famous bishop from Spain, Diego de Landa, wrote down 27 characters of Mayan writing which he believed represented sounds similar to those in the Roman alphabet. The bishop included this list in his famous relation of things found in Yucatan.

But when this old Spanish work came to light in 1864, after centuries of oblivion in a library in Madrid, scholars were vastly disappointed to find that the Mayan "alphabet" was no neat key to unlock the secrets of the Mayan writings. The bishop, it was concluded, must have been the victim of a hoax played by some native informant.

Bishop's Alphabet Defended

Defending the bishop's maligned alphabet, Mr. Whorf now declares: "Landa's list of characters has certain earmarks of being genuine and also of being the reflex of a phonetic system."

Most of the 27 characters, Mr. Whorf explains, are elements frequently met in the Mayan inscriptions, and yet the characters are not precisely the same. They look as though they were dashed off and simplified through habitual use. The 27 characters do not represent all the sounds in Mayan language, nor did the Spanish bishop claim that

they were any complete alphabet, it is now realized.

Aided by the old Landa alphabet and other data, Mr. Whorf has laid down some of the principles on which the Mayan writing was built. Using these, he has been able to translate some of the old texts, and with more study a much larger number will be read, Mr. Whorf declares.

That the matter is far from simple may be seen from this sentence of explanation in his scientific report: "I may now offer as conclusion that the essential principle of Maya writing lay in the use of a complicated syllabary with numerous polyphones and homophones such as the Sumerian syllabary also possessed, and with certain approximations to alphabeticism where the inherent vowel of the syllabic sign was not employed or was reinforced or varied by the addition of another sign."

Publication of Mr. Whorf's paper is hailed as an event of importance in American archaeology. Commenting on it, Prof. Alfred M. Tozzer, of Harvard, stated: "It is with no little satisfaction that the Peabody Museum publishes his paper on a subject which most Maya students have long felt was practically closed. With great acumen and courage Whorf dares to reopen the phonetic question. His paper is full of suggestions and may open up a vista for further investigations along the trail which he has blazed."

Science News Letter, September 2, 1933

CHEMISTRY

American Chemists Struggle to Overcome Potash Monopoly

AMERICAN chemists are successfully refuting Germany's alleged wartime boast that with the world's only source of potash within her boundaries she could starve the world into submission, Dr. J. W. Turrentine of the U. S. Bureau of Chemistry and Soils states in a report to be given at the Century of Progress meeting of the American Chemical Society.

America now ranks as the third largest producer of potash, a necessary agricultural fertilizer. Germany and France are the leading producers. Dr. Turrentine points out the economic value of this product by stating:

"Even during the short wartime period of potash scarcity, some of our

important crops showed evidence of potash starvation."

During the period from 1914 to 1932 imports to the United States declined by 68 per cent. and domestic sales to the total fertilizer potash consumed fell from 16 per cent. to 3 per cent. This achievement has been accomplished without the aid of

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63 per cent

still suppl

value of

\$6,000

A complete presentation of any physical theory involves two parts: first, a statement of the general laws governing the phenomena, and second, an application of the laws to some specific problems of interest to us. Thus in the time of Newton, the scientific thought of the day agitated itself concerning the consequences to be expected from the supposition that the heavenly bodies attracted each other with forces which varied as the inverse square of the distances between them. This constituted the general law, but it remained for Newton to show that one of the consequences of this law was that a planet would travel around the sun in an ellipse with the sun at one focus. This constituted the solution of a particular problem based on the general law.

Again when in 1915 Professor Einstein brought out his general theory of relativity some of the most interesting consequences resulted from his success in applying it to the motion of a planet around the sun, to the motion of a beam of light past the sun and to some of the peculiar motions of the heavenly bodies which were not readily understandable in the Newtonian theory.

It now appears that Einstein has succeeded in working out the consequences of his general law of gravity and electromagnetism for two special cases just as Newton succeeded in working out the consequences of his law for several special cases. It is frequently very difficult to solve special problems illustrating the application of a general law, yet the practical value of a law is enhanced in proportion to the extent to which it is capable of being applied to practical problems. When some actual problem arising in a general theory has been solved, we are in a position to formulate experiments on the basis of that problem with a view to testing the general theory underlying it. It is hoped that the present solutions obtained by Einstein, or if not these, then others which may later evolve, will suggest some experiments by which the theory may be tested.

W. F. G. SWANN

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CONFERENCE AT CHICHEN ITZA

DURING the third week of January there was held at the archeological field station of the Carnegie Institution of Washington at the ruins of Chichen Itza an informal conference of persons interested in development of researches bearing upon the history of man in the Yucatan peninsula. The following were present: Sr. Eduardo Martinez Canton, inspector of archeological monuments for the State of Yucatan, representing the Mexican government; Dr. F. M. Gaige, biologist, of the University of Michigan; Dr. Robert Redfield, social anthropologist, of the Univer-

sity of Chicago; Mr. C. L. Hay and Dr. George C. Vaillant, archeologists, of the American Museum of Natural History; Dr. George C. Shattuck, of the Department of Tropical Medicine, School of Public Health, Harvard University; Dr. A. M. Tozzer, chairman of the department of anthropology, Harvard University; Dr. Eyler N. Simpson, of the Institute for Current World Affairs, and Dr. S. G. Morley, Mr. Karl Ruppert, Mr. H. B. Roberts and Dr. A. V. Kidder, archeologists, of the Carnegie Institution.

The purpose of the gathering was to discuss, without agenda and in a purely preliminary way, the desirability of bringing to bear upon the historical problems of the area the resources of various disciplines and to consider methods for the prosecution of co-operative research. It was accepted as a premise that historical evaluation of the archeological facts derived from the excavations of Dr. Morley and his staff would be rendered immeasurably more precise by the accurate knowledge of environmental conditions which could be supplied by specialists in biology, geology, meteorology, etc.; and of information as to human factors, past and present, which could be collected by workers in documentary history, medicine, comparative linguistics and the several social sciences. It was taken for granted that the findings of such non-archeological specialists would not only be of intrinsic value to the sciences represented by them, but that they would gain cumulative importance because geographical concentration would permit pooling of data, interchange of ideas, as well as formulation of combined attack upon problems of common interest. It was felt by the majority of those present that precise statement of objectives and rigid organization would be unwise; that research should be allowed to flow in such channels as the shifting contours of individual investigations might throw open; and that propinquity and the mutual interest stimulated by simultaneous attack upon related problems would lead naturally to a more effective type of cooperation than could, in the present embryonic state of most methodologies, possibly be planned in advance.

The conclusion, therefore, was that all studies should be independent, intensive and highly specialized, and that limited and definite goals within each science should be aimed for. A historical view-point, in the broadest sense (in other words a consciousness of the implications of the time element in the recording and interpretation of phenomena), should, however, be adhered to; and close but informal touch should be maintained among all workers in order that they should keep cognizance of the methods, the general trends and the bearing upon their own fields of each other's activities.

The above more or less theoretical aspects of the

matter having been considered, attention was turned to specific investigations and stock was taken of researches in progress or in contemplation. At present under way are the following: Archeological work at Chichen Itza, under direction of Dr. Morley, now in its seventh year; excavations at Uaxactun, Department of the Peten, Guatemala, under direction of Mr. O. G. Ricketson, Jr., fifth year; hieroglyphic research by Dr. Morley; ceramic survey of the Maya area by Carnegie Institution, being inaugurated during the present year by Mr. Roberts (all the foregoing are projects of Carnegie Institution); medical survey of the Yucatan peninsula by Harvard University and Carnegie Institution, now in its second year; records of Chichen Itza clinic administered by Miss MacKay, third year; biological reconnaissance (1930) by University of Michigan, Dr. Gaige; ethnological reconnaissance (1930) for Carnegie Institution by Dr. Redfield, of the University of Chicago; studies of Maya

linguistics at Chichen Itza by University of Chicago, Dr. Andrade (1930).¹

Proposed activities of the Carnegie Institution are: historical work on the Conquest and the Colonial Period; retranslation and collation of the books of Chilam Balam; investigation in physical anthropology by Department of Genetics; air-survey of Maya area. All the above were discussed, and consideration was given to the relation to various aspects of the project of climatology, geology, sociology, psychology, etc. Advantage was taken of the presence of Messrs. Tozzer, Hay and Vaillant to review in detail the local archeological investigations of the institution, to consider its wider implications and to solicit their advice as to future activities.

A. V. KIDDER

CHAIRMAN, DIVISION OF HISTORICAL
RESEARCH, CARNEGIE INSTITUTION
OF WASHINGTON

SCIENTIFIC APPARATUS AND LABORATORY METHODS

LABORATORY AND TEACHING DEVICES MADE FROM PLASTER OF PARIS

OCCASIONS in the teaching and research laboratory often arise when an irregularly shaped vessel or chamber is desired or when one wishes to construct a teaching model which will greatly resemble the original. For this purpose plaster of Paris has long been used. Several decades ago A. Edmunds¹ used it for the construction of kidney and intestinal oncometers. More recently the writer has had occasion to employ it for both teaching and research apparatus.

Some time ago while teaching a general course in hygiene and public health at the summer session of a normal school, the writer discussed the utility and necessity of septic tanks in rural or semi-rural communities. The difficulties in explaining the various features of septic and Imhoff tanks were well-nigh unsurmountable. This led to the idea of constructing small models of these tanks.

Using the proportions given in the standard text and reference books, but greatly reducing the dimensions, foundations were made from wire cloth such as is used in screen doors; the corners were either bound with fine wire or soldered. It was found best to use small wooden strips as stretchers inside of the frame until after the first, external, coat of plaster had hardened. These stretchers were then removed and a coat of plaster was applied to the internal surface of the wire. After this coat had hardened, irregularities were removed by scraping with a knife, rubbing with coarse sandpaper or by the application

of a thin mixture of plaster of Paris rubbed down with the fingers. Small brass pipes were used at the points where the inflow and outflow pipes are regularly found.

When constructing Imhoff tanks, it was found best to make the floor and side walls of the settling or upper chamber of glass plates in order to render the interior of the sludge chamber visible. The sludge pipe was made from a piece of $\frac{3}{8}$ -inch brass pipe to which was soldered a short length of the same sized pipe at a 15° angle. This latter short piece of pipe was passed through a hole made in the side wall of the model after which repairs to the wall were made with plaster.

Recently during an investigation of the circulation of the liver,² the writer found it necessary to construct an air-tight chamber suitable for receiving the livers of cats, dogs and rabbits in their natural position while fluid was being perfused through them. In this case a V-shaped box was made from $\frac{1}{4}$ -inch wire netting, the corners soldered, and this box was covered with plaster of Paris in the manner described above. Here, however, the open edge was built up well above the wire frame and nearly an inch wide. When the plaster was well hardened, the box was held in the obverse position and the edges about the open end were ground smooth with sand paper so that a piece of glass would form a closely fitting cover. A beeswax-vaseline mixture of proper melting-point was

¹ Summaries of the results of these units of work will appear in the Year Book of the Carnegie Institution in December, 1930.

² A. R. McLaughlin, *Journal of Pharmacology and Experimental Therapeutics*, 34: 147, 1928.

¹ A. Edmunds, *Journal of Physiology*, 22: 380, 1898.

and in the past between continents and islands which are separated by deep oceanic barriers. If the ridges of the ocean represent submerged land bridges, it is highly probable that dredging their walls, which are proving to be very steep, will bring to light evidence of their former emergent condition. If, on the other hand, the continental drift hypothesis has caused the formation of parts of the ocean in recent times, no ancient formations should be revealed on the ocean floor in these places. In the same connection the nature of deep oceanic lavas has been the subject of much speculation.

The accumulated evidence in regard to submarine canyons has made it difficult to avoid the conclusion that these canyons were cut as a result of a lowering of sea level of at least 6,000 feet in not very remote times. If this sea level lowering has actually occurred, it should have left its imprint on the rock of at least the upper mile of the ocean floor. Dredging rock from various parts of the ocean remote from the localities where submarine canyons have been discovered will probably check this interpretation. Such things as weathered formation surfaces, the presence of pholad borings and the presence of shallow water incrustations would be evidence in favor of the general lowering.

These possibilities represent only a few of the results which may be expected from a program of intensive geological research in this new field. The time is ripe for geologists to join the oceanographers in the exploration of the seas.

FRANCIS P. SHEPARD

UNIVERSITY OF ILLINOIS

THE MAYA BREADNUT IN SOUTHERN FLORIDA

THE native flora of southern Florida is distinctly tropical, comprising hundreds of genera of forest trees, epiphytes and undergrowth plants that are shared with the West Indies and with the land of the ancient Maya civilization in southern Mexico and eastern Guatemala. Some of the Maya country is much like southern Florida, a succession of limestone reef formations, with swamps or sandy stretches between, though mostly covered now with dense continuous forest. Much of the interior of Florida is denuded and in the winter becomes very dry and frosty, but the need of restoring the forest cover is being recognized, and some of the Maya trees may contribute to the tropical reclamation. The Maya architecture is being imitated in northern cities, but in Florida could have a natural setting of palms and other stately trees, the same as in Mayaland.

One of the Maya trees that may be useful in Florida is *Brosimum alicastrum*, related to the true breadfruit

of the Pacific Islands, *Artocarpus communis*. Though most of the breadfruits are seedless, other varieties have large starchy seeds that are boiled or roasted and taste like Spanish chestnuts. The seeded breadfruits are called "breadnuts," and *Brosimum* shares this name in British Honduras and Jamaica, because the seeds are similar in texture and taste to those of the seed-bearing varieties of *Artocarpus*. The *Brosimum* fruits are single-seeded, but the trees bear well and the nuts are gathered by the Mayas for making their native bread when stocks of maize run low. The Maya name of the *Brosimum* tree is *ox* or *osh*, the same word being applied to the primitive taro-like root-crop, *Xanthosoma*, and to stocks of shelled maize kernels, although the general name for maize is *ixim*. An age of root-crops probably preceded maize culture, and an original use of *osh* for *Xanthosoma* may explain why this word also designates the numeral 3, the large "elephant ear" leaves of *Xanthosoma* being conspicuously 3-cornered.

Another outstanding Maya tree is *Achras sapota* or *Achras chicle*, hardly to be distinguished from the well-known sapodilla tree of the West Indies, that thrives in southern Florida and even escapes from cultivation, especially on the Keys. The chicle fruits are the same as sapodillas, russet-skinned, juicy and delicious, with the texture of high-quality pears. The chicle latex is the principal source of chewing-gum, and the wood has amazing durability, as shown by many chicle-wood lintels still in place over the ancient temple doorways, dating centuries back.

The chicle and breadnut trees are found in special abundance among the ruins of the Maya cities, and are largely responsible for the archeological discoveries of the last half-century. The chicle gum provided the inducement for exploring and cutting trails through the forests, while the breadnut foliage foddered the mules that carried the *chicleros*, and later the archeologists. At every forest camp breadnut trees are felled and the branches lopped for the animals to browse on the leaves and twigs. Such fodder is called *ramon* in Spanish, and this name is applied to *Brosimum* and to several fodder trees in other regions.

The ancient Mayas had no livestock, but may have gathered and stored the breadnuts, like breadfruits and taro in the Pacific Islands. The Maya cities were equipped with great numbers of subterranean storehouses, sometimes taken for water-cisterns, but small and flat-bottomed like primitive food cellars in other parts of the world. These are the so-called "chultunes," bottle-shaped, smooth-walled chambers eight to ten feet deep and nearly as wide, entered by a small central opening through the hard surface rock, fitted with a stone lid and sealed with clay.

In view of *Brosimum* being related to the bread-

fruit, and of the remarkable long-period storage of fermented breadfruit paste in the Pacific Islands, a study of food values and storage behavior of the Maya breadnut would be of agricultural and historical interest. The question naturally arises whether the early Maya civilization, that built so many large cities and occupied them for the long periods shown by the dated monuments, could have been supported by a migratory "milpa" agriculture like that of the present day, calling for a new forest clearing every year to grow the family maize crop. A use of long-lived, hardwood tree-crops would render the ancient Maya agriculture somewhat similar to that of the archaic "Golden Age" in the Mediterranean countries, where olives, figs, grapevines and pear trees were chiefly relied upon.

Forage or fodder may prove more important than food uses, if *Brosimum* becomes established in southern Florida, where, as in other tropical regions, dairies are difficult to maintain. Groves of large *ramon* trees are considered in the Maya country as the best pastures, the cattle being greedy for the fallen leaves as well as for the nuts. Also the trees may be tapped and the latex mixed with chicle or drunk like cow's milk, the natives reporting it good for nursing mothers and asthmatics. A related species, *Brosimum utile*, is the "cow-tree" of Venezuela, made famous by Humboldt as furnishing a potable latex, not to mention "cow trees" of other countries and of other botanical families. The Maya breadnut trees now growing in Florida, at the Plant Introduction Garden near Coconut Grove, were raised from seeds collected in April, 1922, in the district of Tikal and Uxactun in northern Guatemala, and brought to Washington.¹

O. F. COOK

BUREAU OF PLANT INDUSTRY

SOME EUGENICAL ASPECTS OF THE INDIANS OF PISTE, YUCATAN

PISTE is a typical Maya village, located in the center of the political state of Yucatan. It is Indian in culture, modern medical science is practically unknown and nature is allowed complete freedom. In 1935 there were 415 inhabitants, of whom 207 were males and 208 females. The birthrate, calculated over a 17-year period, was 60.1 per M, and the deathrate 31.7 per M. The secondary sex ratio of 513 children born in this town was 108.5 males to 100 females. Births are attended by native midwives, and native medicinal practises are used. The average interval between births for 147 infants from 51 mothers was 28 months. Birth control is not practised in this community, and comparatively few abortions and stillbirths occur. The average number of children from 33 completed

¹ See *Official Record*, U. S. Department of Agriculture, May 17, 1922.

families was 6.69. The average age of mothers at the birth of the first child was found to be 18 years. This figure is based on exact birth dates. In this town there is only one woman over 25 years of age who is unmarried, and this is probably due to the fact that she is blind. Of the 513 children born into 109 families, 17.2 per cent. died before 2 years of age; of these 56 per cent. were males and 44 per cent. females. Not much can be said at present as to the life span of these people, since the birth dates of the older members of the population are not accurately known. It is the author's impression, however, that the older members do not live much longer than 60 years.

Since 1800 there have been two general migrations from the town. Before 1847 Piste was a thriving mestizo (Spanish-Maya cross) town. From that date to 1880 the town was completely unoccupied. This was during the War of the Castes. After 1880 it was reinhabited, increasing in population until in 1918 there were 474 inhabitants. About 1920 there was a political revolution which caused another exodus of 200 or more people, after which the population began to increase in numbers until in 1935 there were 415 inhabitants.

Naturally in these interior towns there is considerable inbreeding, and these 415 people can mostly be catalogued in the leading family pedigrees, *e.g.*, Tun, Mex, Dzib, Ceme, Mis and Cauich. There are, however, no obviously feeble-minded people in this town.

In Piste during the 17-year period there were seven pairs of twins born and one set of triplets.

The diseases of the Maya Indians of Yucatan are considered at length in Publication 431 of the Carnegie Institution of Washington, and the social customs in Publication 448 of the same institution.

MORRIS STEGGERDA

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TACONIC THRUSTING AND PALEOGEOGRAPHIC BASE MAPS

THE original position of early Paleozoic sediments in eastern North America has been altered by later folding and thrusting so that the present map gives a foreshortened base relative to ancient geography. This was recognized by Schuchert¹ in his spreading seaways to their interpreted original width on the present base. In this method, the position of early Paleozoic outcrops becomes anomalous with respect to the mapped distribution of the seas in which they formed. The writer has prepared a paleogeographic base map in which each of the principal Taconic thrust sheets in western New England has been stretched to overcome the foreshortening in its width. Then each slice has been moved back from the foreland

¹ C. Schuchert, *Bull. Geol. Soc. America*, 41: 704, 1930.

ARCHAEOLOGY

Most Important Mayan Pottery Jar Found in Burial Vault



AMERICAN ART

PUBLIC HEALTH

Nation's Health Good, Congress is Told

THE HEALTH of the people has continued generally good, in spite of economic depression and unemployment, Surgeon General Hugh S. Cumming declared in his annual report to Congress. He warned against making any predictions as to future effects of the depression on the nation's health.

A new low record for the tuberculosis death-rate was set and a low diphtheria death-rate was also recorded for 1931.

Scientific achievements of the research staff of the U. S. Public Health Service included discovery that cultures of plague germs could cause disease after being stored for nine years and that the causative virus of endemic typhus fever remained alive in rat fleas for 52 days. It is thought that fleas once infected remain infected throughout life, an important point since it is this insect that transmits the disease to man.

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Science News Letter, December 24, 1932

THE MOST IMPORTANT piece of pottery ever found in the land of the Mayas, in Yucatan. This is the verdict of science on a tall cylindrical jar found in a burial vault inside a pyramid in the oldest known city of the Mayan Indians, Uaxactun.

On the jar is painted a scene of some great event in the ancient history of America. There is a man of importance, seated cross-legged on a dais; a figure back of him with an offering, a third back of that with a ceremonial staff. And before the throne stand two stiffly formal Indians in high plumed headdresses and robes of figured material. Ambassadors before a powerful Mayan chieftain? Perhaps.

What gives the scene its greatest scientific importance is the fact that the artist accompanied his picture with a date. Two vertical bands of little square pictures form the date in the curious hieroglyphs which the Mayas used as their writing system. Dr. Sylvanus Morley, of the Carnegie Institution's staff, reads this date as the equivalent in our calendar system of either 120 B.C. or 140 A.D. Scientists are not altogether agreed on the method of translating the Mayan signs, hence two possible readings, one of them two centuries later than the other.

First Complete Date

This very early date painted on a pottery jar is the first complete Mayan date ever found on any medium other than stone or stucco.

Considering that modern science cannot read all of the Mayan writing, it is remarkable that modern science can detect mistakes made by ancient Mayan writers. Yet Dr. Morley, a recognized authority on the Mayan hieroglyphs, found on examining the dated jar that there was something wrong with the symbols. It was as if the artist had carelessly written Sunday, December the first, 1932, whereas the first fell on Thursday. Several small corrections in placement of dots and bars are sufficient to make the date one that fits into the Mayan calendar of about 2,000 years ago.

The painted pottery in the burial

vaults of Uaxactun is also important artistically. It shows how very early in their history these aboriginal Americans were capable of fine ceramic art, even judged by modern standards.

The vault containing the most important piece, the tall jar, was the resting place of a man. The skeleton lay at full length, with the hands folded toward the right shoulder. The beautiful jar held strange contents—the bones of over a hundred shrews. Lying about were other objects of real or symbolic value, including a jade bead, sea shells, a stingray tail, a turtle bone, a deer antler, and a carved bone necklace.

Science News Letter, December 24, 1932

GENERAL SCIENCE

Scientists Gather For Great Midwinter Meeting

ONE AND ONE-HALF million words of scientific discussion, enough to fill a bookshelf of respectable-sized volumes, will be precipitated in Atlantic City when the American Association for the Advancement of Science, together with something over forty of its affiliated societies, hold their midwinter meetings during the week after Christmas. Notices of presentation for approximately 1400 papers, which will average between 1000 and 1200 words apiece in length, have been received at the Washington headquarters of the Association.

This great flood of scientific information will be poured out before audiences totalling about 4000 persons, constituting only a little over a fifth of the total membership of the Association, which is now in the neighborhood of 19,000. The whole group will come together on several occasions in the vast Atlantic City auditorium, which is so huge that a full-sized football field can be laid out on its floor. But to facilitate discussion of most of the papers, the scientists will divide themselves into sectional and separate society meetings, comprising groups from a few dozen to several hundreds of persons.

Science News Letter, December 24, 1932

ARCHAEOLOGY

Most Important Mayan Pottery Jar Found in Burial Vault



AMERICAN ART

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Science News Letter, December 24, 1932

PUBLIC HEALTH

Nation's Health Good, Congress is Told

THE HEALTH of the people has continued generally good, in spite of economic depression and unemployment, Surgeon General Hugh S. Cumming declared in his annual report to Congress. He warned against making any predictions as to future effects of the depression on the nation's health.

A new low record for the tuberculosis death-rate was set and a low diphtheria death-rate was also recorded for 1931.

Scientific achievements of the research staff of the U. S. Public Health Service included discovery that cultures of plague germs could cause disease after being stored for nine years and that the causative virus of endemic typhus fever remained alive in rat fleas for 52 days. It is thought that fleas once infected remain infected throughout life, an important point since it is this insect that transmits the disease to man.

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Science News Letter, December 24, 1932

The Lost Empires of the Itzaes and Mayas

An American Civilization, contemporary
with Christ, which rivaled the
Culture of Egypt

by

THEODORE A. WILLARD

author of *The City of the Sacred Well*

With Analytical Index, map, detailed plans of the ancient cities, and 74 plates of archaeological remains, temples, sacrifices, sculpture, art, costumes, crafts, hieroglyphs, etc. Handsomely printed in large Caslon type on Covenant laid deckle-edged paper. One volume, large 8vo, 450 pages, cloth, uncut, gilt top.

Price \$6.00 net

OUT OF THE SILENCE of the centuries archaeologists are beginning to unveil the mysteries of a vast, forgotten American empire. Within the heart of the Central American jungles they have found the glistening white pyramids of its lost cities, rising like veritable mountains of polished, cut stone. Ornate palaces of kings, royal courts of games, temples of fire and human sacrifice, and massive walls of bas-reliefs have reluctantly yielded to their persistent scientific efforts secrets of the life of the soft-eyed, sandal-footed people who mixed amazing heights of social and intellectual achievement with practices of unmitigated brutality and horror.

The Lost Empires of the Itzaes and Mayas is the story of this ancient culture. It is a history of the Itza-Maya civilization which suddenly appeared, fully developed, in what is now Yucatan; flourished from before the fall of Rome to the advent of the Spanish *conquistadores* in the New World; and as suddenly died from the effects of internecine warfare and outside invasion. It is a vivid reconstruction of the life of

an ancient people, their arts and sciences, laws, customs, language, system of hieroglyphs and calendar, religion, ceremonies, economics, government, lore and legends, dress, daily existence, heroes and accomplishments, methods of warfare, and struggles against the Spanish, based upon the recent explorations and upon the original writings of the Itza-Mayas and the Spanish.

The origin of this strange people still remains a mystery. Did the Itzaes come from the lost continent of Atlantis? If not, how explain their fully developed civilization? Did they come from the orient? If not, how explain their strikingly Mongolian sculpture? Were they one of the ten lost tribes of Israel? If not, how explain their earlier monotheistic religion, their Hebraic appearance, their biblical traditions and practices?

Their legends and folklore are particularly interesting. They include stories of the origin of the Mayas, of the flood, of creation, of civil and religious ceremonies and rites, of miracles, of exploits of war, of the stolen bride, of Aguilar's temptation, etc.

Magnificent and terrible ceremonies of sacrifice to the gods of rain, fire, and harvest are described in an unforgettable manner, as are the more joyful feast days, game festivals, and religious pilgrimages.

The early Spanish explorers are discussed. They include Columbus, Montejo, Cortes, Diaz, Bishop Landa, and others.

The author has spent much time during the past twenty years in Yucatan. He has worked side by side with native laborers in the excavations, and has studied carefully the hieroglyphic system, date stones, and calendar of the Mayas, as well as the only three extant Maya codices and the Spanish archives.

THE ARTHUR H. CLARK COMPANY
Publishers, GLENDALE, CALIFORNIA

ARCHAEOLOGY

Hidden Temple Found Within Mayan "Castle"

A BEAUTIFUL temple hidden within a temple has just been discovered by Mexican government archaeologists at the old Mayan city of Chichen Itza. The hidden temple is in the lofty Castillo or so-called "Castle", a temple to the Feathered Serpent god, perched on the highest pyramid base in the city.

Aware of the ancient Indian trick of building new structures over old, to honor the gods or to mark the passing of periods of time, no one knows exactly why, the excavators began a year ago to probe into the interior of the gigantic substructure of the Castle.

At first they encountered only walls of a smaller inner pyramid. Later they found a human sepulcher. The burial was accompanied by funeral offerings of turquoise mosaics, thousands of turquoise beads, and exquisitely carved fine jades.

This year they followed the sloping walls of the hidden pyramid upwards, and came upon a stone shrine on the flat summit. The building thus discovered is almost perfectly preserved. The early pyramid and temple had not been destroyed, but merely heaped over with earth and rock to form a larger base for the present shrine of the Feathered Serpent. The roof of the buried temple is flush with the flat summit of the present temple, and forms the floor of the adulatory.

While the theme of designs of the exterior temple consists of plumed serpents and warriors, the most import-

ant decorations of the older shrine are tigers. The tigers are sculptured in stone on the frieze above the door. The facade also has bands of geometrical designs, ornamental shields, and flower-like rosettes sculptured into the stone. These decorations are entirely different in style from those of the present outer temple.

Science News Letter, December 30, 1933

ARCHAEOLOGY

Turquoise-Jade Plaque Found in Warrior's Tomb

MEXICAN archaeologists who are exploring the Mayan tomb they have discovered under the Castillo pyramid, in Chichen Itza, have spied a rare object, a mosaic plaque of turquoise and jade. The plaque is lying in a stone box under other fragile articles not yet removed.

Eduardo Martinez Canton, inspector of archaeology in Yucatan, wired immediate news of the discovery to the Mexican department of archaeology in Mexico City. The bits of blue and green stone that make the pattern of the mosaic are on a decomposed wood base. When the Carnegie Institution discovered such a plaque in Chichen Itza four years ago, a museum preparator was brought from New York to undertake the restoration. A Mexican Museum technician will reconstruct the new plaque.

The tomb under the tall pyramid known as the Castle contains a few crumbling human bones. Turquoise spearheads suggest that the personage buried under the temple was a warrior. The position of the bones indicate that the warrior was not the original occupant of the tomb, but was placed there later.

Science News Letter, July 9, 1932

ARCHAEOLOGY

Hidden Pyramid Found In "Castle" at Chichen Itza

A TUNNEL sunk into the side of El Castillo, chief of the temple-topped pyramids of the ancient Maya city, Chichen Itza, has revealed an older pyramid within. A large stone tiger was discovered near an old interior wall.

The habit the ancient Indians of Mexico had of enlarging an old substructure for a temple by heaping it over with earth and rock, has forced a new technique on Mexican archaeologists the past few years. In order to show the inner structures, and not disturb the outer covering, they make tunnels by which visitors can view the works of different epochs in the past.

The Castillo of Chichen Itza is a pyramid almost 100 feet high. A beautiful limestone temple to the feathered snake god Kukulcan stands on top. It is called the Castillo, or castle, because in the Spanish conquest of the Mayas, the white men used it as a fort.

The Mexican government has now restored the temple, and two of the panelled sides of the supporting pyramid. Through the other two sides, left in their ruined state, Mexican archaeologists have sunk the tunnels that reveal the inner structure of the pile.

Science News Letter, May 21, 1932



Relic of the Past

Among the exhibits of Mayan pottery from Guatemala was the little figurine shown on the front cover of this week's SCIENCE NEWS LETTER. This figure has the interesting device of a slit in the back of the head letting the light show through the eyes. As you walk past the figure, this spot of light appears to move, thus giving the effect of moving eyes following you.

Science News Letter, January 12, 1935

RVICE



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Science News Letter, January 12, 1935

R V I C E

Retake of Preceding Frame

PIONEERS OF MAYAN RESEARCH

BY WILLIS FLETCHER JOHNSON

SOME amusement, much exultation—on behalf of others now, alas! not here to feel it for themselves—and, I fear, a little of the spirit of “I told you so!” rose in my mind at the manifestations of popular and scientific interest in the recent discoveries and rediscoveries in Yucatan, together with wonderment almost akin to awe at the coincidence of those performances with the achievements of Lord Carnarvon in the Valley of the Kings—a coincidence which prompted many references to Yucatan as “the Egypt of America.” For I remembered the real pioneers of Mayan research, who at Uxmal, Chichenitza, and elsewhere a generation ago discovered and examined most of those mighty remains of ancient civilization which are now exciting the admiration of archæologists, and who at that time explicitly indicated the closest of historical relations between Yucatan and the Valley of the Nile. But neither scientists nor the public would then credit, or even respectfully listen to, the veracious revelations of those explorers, but ridiculed and denounced them as emulators of Baron Munchausen.

It is now about forty years since I first met and had the privilege in a very humble capacity of co-operating with Dr. Augustus Le Plongeon and his gifted wife, who was formerly Miss Alice Dixon, of Brooklyn. They had recently come from their years of labor, peril, and gigantic achievement in the wildernesses of Yucatan, and were settled in an old granite and brick mansion on Washington Street, Brooklyn, adjoining the original building of the Brooklyn Institute, both structures a little later demolished to make room for the railway extension of the Brooklyn Bridge approach. There they had a vast accumulation of Mayan antiquities, and of photographs, sketches, and papier-mâché casts of inscriptions, statuary, and architectural decorations, enough to stock a large museum of unsurpassed interest. It was expected by them that these fruits of their toil would be accepted by some museum or learned society, and that an appreciative hearing would be given by scientific bodies and by the public to their revelations of the marvels of Mayan civilization and of the history, mythology, and folk-lore of that people.

In this they were bitterly disappointed. Ears were deaf, eyes were blind, and doors were barred against them. A few, a very few, American scholars recognized the epochal value of their work and gave them credit for it. The majority were coldly indifferent or openly hostile. All the

actors in the wretched tragedy are now dead, and I shall not recall their names. But some of the most influential leaders and patrons of American archæological and ethnological research apparently set themselves to discredit Dr. Le Plongeon and to prevent recognition of his achievements. They derided him and denounced him as a romancer and fabricator, at par



SCULPTURED PORTRAIT OF QUEEN MOO IN HALF-RELIEF ON THE ENTABLATURE OF THE EAST FAÇADE OF THE GOVERNOR'S HOUSE AT UXMAL. PHOTOGRAPHED BY DR. LE PLONGEON

with the author of the notorious “Cardiff Giant,” then still fresh in memory. They went so far as to deny that the Mayas were ever a people of importance or that they had any civilization or left any remains worth studying; certainly they were not to be compared with the Aztecs and Incas! So Dr. and Mrs. Le Plongeon got no adequate public hearing, and their books had to be published at their own expense. Yet to-day all the revelations which they then made and which were ridiculed and rejected are completely verified.

It was at the cost of no little personal peril that the Le Plongeon undertook their epochal quest, for at that time the Maya nation was still independent, and was intensely suspicious of foreigners and inclined to treat them rather strenuously. Since 1847 they had held their own against Mexico—I remember that in my school geographies Yucatan was described and portrayed on the maps as a separate country—and it was not until after the Le Plongeon went thither

that Porfirio Diaz succeeded in bringing them into the Mexican Republic. The success of Dr. Le Plongeon in ingratiating himself with the Mayas, so that he was not only permitted to conduct his researches freely, but was welcomed, assisted, and treated with peculiar favor and confidence, was due to two causes. One was his skill in treating yellow-fever patients. He had himself had that disease severely, and was thus practically immune, and of course quite fearless in visiting and treating patients.

The other and more influential cause was of a more romantic nature. In the course of his explorations he came upon a heroic statue of one of the great demigods of Maya mythology, exquisitely carved and well preserved. As the encumbering vines were torn away, revealing the stone face, the native workmen started back in amazement, then turned their eyes upon Dr. Le Plongeon with looks of awe and wonder, and finally fell before him in an attitude of adoration. When he demanded the meaning of their extraordinary conduct, they pointed to the stone face, and then at him. This added to his bewilderment until Mrs. Le Plongeon, heroically concealing the almost irrepressible mirth she felt, whispered to him, “They think it’s your statue, or that you are their god, returned to life.” And indeed the likeness was startling. Had the statue been meant for an effigy of the explorer, it could scarcely have been more perfect. Nor could Dr. Le Plongeon’s disclaimers persuade the Mayas that it was not he. Their chief priests were called into consultation, and solemnly proclaimed to the people that one of the great heroes of Maya antiquity had indeed returned to them. Thereafter Dr. Le Plongeon was regarded with little less than adoration; his every wish was law, and the priests and wise men revealed to him much of the ancient lore of the Mayas which was withheld from the common people, including the meaning of many of the hieroglyphs and many of the proper names and other words of the ancient Maya language. They also told him in detail the story of the tragic downfall of the Maya Empire and the relationship of Maya civilization and mythology to that of Egypt and India.

Dr. Le Plongeon did not at that time essay to determine the much-vexed question of the single or the multiple origin of the races of men. But he did most resolutely maintain that close intercourse had existed between the Mayas and the peoples of the Eastern Hemisphere. Of this he adduced many indications which

had known for years, and so when a brother-in-law back in the old farm community wrote telling about his troubles they immediately advised him to sell off his holdings and join them in town. Within six months five different families from that one community gave up the struggle on the farm and answered the call of the city.

Perhaps that is why Secretary Wallace's survey last year showed such a high percentage of increase in migration to the city. That is why, no doubt, as I pick up a newspaper I read advertisements like this:

For Sale—160 acre farm, live stock, tools, etc. Ten miles from town, on good road. May be purchased for less than cost of the improvements. Owner moving to city.

But what is to come of all this? Where will it end? Is it the city or the country that must suffer from this movement? Perhaps both will suffer. Let us look further.

Undoubtedly, the first effect on the country is all to the good. Every time a farm family moves to town the number of food producers is decreased and the number of purchasers of food increased. In other words, a five per cent shift in population becomes a ten per cent change in the food situation.

Now this process cannot go on long without involving very profound changes in our National economic structure—not to mention our social and moral structure.

Just now there is a great demand for workmen. But is it a safe and solid demand or an artificial and misleading demand? The war period left us with a great housing shortage. Our railway equipment had run down, too. We had a new appreciation of good hard-surfaced highways, and we bonded ourselves for many hundred million dollars' worth of highway improvements. This in turn opened up new markets for automobiles, and we are right in the flush of supplying this demand.

All this brings a show of prosperity. We are patting ourselves on the back—and putting prices up a notch higher.

Again let us ask, is this apparent prosperity on a safe and sound basis?

Some day, perhaps not very many years hence, we as a nation shall be on a self-supporting and self-contained basis. We shall export little but tourists. In that day we shall care little about world price levels. Prices in this country will be the only things that count. We have within our continental and insular boundaries practically all the raw materials we need, and we could be practically independent of the world, although under such conditions our business growth would have to be slowed down somewhat.

Problems of the American Farm

WITH Mr. Kile's article The Outlook has begun a series of discussions of American farm problems and American farm resources. These articles will deal with both the opportunities and the difficulties of our farm population. Three of these articles illustrate their varied character:

Banking on Character

By George M. Rommel

tells the story of a farm loan system built on the honor of the men who operate it.

The World's Struggle for Fats

By Charles W. Holman

recounts the amazing demand for vegetable oils and the interplay of agriculture and industry in the solution of this problem.

Three Jews Who Are Helping Make Farming Pay

By Silas Bent

is an illuminating study of the application of economic science to the problems of farm marketing and farm finance.

Other farm articles will be announced in future issues.

But that day of self-sufficiency has not arrived as yet. We are at present so adjusted as to depend upon export to utilize a certain margin of our production. Cutting off this surplus, particularly at this time, when we are over-equipped with war-expanded production facilities, would mean a distinct slowing up in all lines. Let this take place, and all the veneer of apparent prosperity would be torn away in an instant. It would be seen, for instance, that a considerable share of the present demand for houses comes from those who have moved in from the country, like Mr. and Mrs. Farmer, to help build houses. A good share of the demand for automobiles and furniture comes from those who are getting high salaries and wages for designing, building, and selling these houses. And so on down the line. It is a regular house-that-Jack-built proposition. A stoppage any place in the line would tie up the whole procession. Obviously this is a dangerous sort of prosperity. It is so likely to blow up without much warning.

The thing that threatens—threatens ominously and near at hand—to interrupt what might otherwise be safe, sane, and solid prosperity, is this high price level, artificially maintained by labor and industry. These groups have marooned themselves on an island of high prices, so far as world trade is concerned.

It is cutting off our exports of manufactured goods. It has greatly cut down the purchasing power of the farmer. The channels of production and trade are not in proper working order. This temporary spurt of activity in building and related lines, coupled with a sort of secondary inflation reflected in increased activity at the banks, is not fooling the really broad-visioned business leaders.

Most business men and labor leaders are, unfortunately, so busy skimming the cream as fast as it rises that they haven't time to inquire as to what makes it rise, or even whether it will keep on rising. But there are many in positions of prominence here and there who recognize this price-relationship situation at its full significance as a pressing National problem. They see that it must be met at once in order to avoid ultimate catastrophe. And, furthermore, they realize that unless labor and industry correct this situation themselves there will be plenty of tinkers in the next Congress ready to make the necessary adjustments. And experience has shown that in the heat and turmoil of Congressional action the monkey-wrench and over-size sledge-hammer are frequently used, where the same result might be accomplished with less pain to all concerned by the use of more delicate and better-suited tools.

seemed quite convincing. Thus on the walls of the great temple at Chichen-itza he found Maya hieroglyphs intermingled with others which were unmistakably Egyptian. Placing, as I did, photographs of the two side by side, it was impossible to distinguish between those which were on the banks of the Nile and those which were in the wilderness of Yucatan. One day I received from a friend in Burma a portfolio of photographs of sculptures and elaborate architectural decorations. This I took to Dr. Le Plongeon and showed it to him, whereupon he produced photographs of Maya sculptures and decorations substantially identical with the Burmese.

Still more striking were the linguistic and legendary resemblances. The very name of Maya was a case in point. The root, "Ma," signifies in the Maya language the earth, or a place; and it was thus used by ancient Indian sages. The mother of Gautama Buddha was named Maha Maya, and in the Indian epic "Ramayana" the name Maya is borne by a great warrior and explorer. Of course the goddess Maia is well known in Greek and Roman mythology, and it is significant that May-day festivals, including dancing around a ribbon-decked Maypole, have been practiced by the Mayas from time immemorial. The name or title Kan was borne by the ancient sovereigns of the Mayas, and Dr. Le Plongeon plausibly identified it with the familiar Khan of Asiatic countries. As for legendary lore, that of the Mayas bore striking resemblance to that of Asia and Europe. The story of Cain and Abel was unmistakably set forth in great colored cartoons on the temple walls. The story of the Noachian Deluge was a part of Maya tradition, even to the detail of forty days and forty nights of rain.



SEMI-RECUMBENT STATUE OF PRINCE COH. DISCOVERED AND PHOTOGRAPHED AT CHICHENITZA BY DR. LE PLONGEON IN 1875

But, since these two Biblical legends are common to many other lands, still more impressive, to my mind, was the Maya tradition of Atlantis. This told of a great island in the middle of the Atlantic Ocean, called Mu in the Maya language, which was submerged by the convulsions of an earthquake some eight or nine thousand years ago. On the Pyramid of Xochicalco Dr. Le Plongeon found inscriptions telling that it was erected as a memorial of the lost island of Mu, and was made as a model of the sacred hill in that island—the sacred hill which Plato in his account of Atlantis describes as crowned with a temple dedicated to Poseidon.

Seeing that the Atlantis legend originated in Egypt, or at least was imparted by the priests of that coun-

try to Solon, and from him passed on to Plato, it was most interesting to Dr. Le Plongeon to observe that the inscriptions relating to it consisted of Maya and Egyptian hieroglyphs intermingled.

Another resemblance between the Mayas and the ancient Egyptians was in the fact that in both countries royal brothers and sisters were required by religious law to marry, and it was this custom which led to the great tragedy of Maya history. The famous Queen Moo (the name is pronounced to rhyme with "snow") was required to marry her brother Aac (the vowel sounded as in "dark"). But she refused, and instead married another brother, Coh (the name also rhyming with "snow"). In consequence, Coh was treacherously murdered by Aac, who admitted his guilt and was exiled from the royal city of Chichenitza, another brother, Cay (pronounced Kah-ee), who was the High Priest, prophesying that the crime would cause the downfall of the Maya Empire. Queen Moo built a great memorial to Coh in the great square at Chichenitza, where Dr. Le Plongeon found a recumbent statue of Coh and a stone urn containing what was believed to be his heart embalmed with red oxide of mercury, together with a carved stone talisman of Queen Moo's, which she placed there in order to link her destiny with Coh's in the future life. Later Aac began a war to regain the throne and to compel Moo to marry him. Moo was defeated and fled from the country, while Aac became a tyrant and was deposed and slain by his own people. Thus the Kan dynasty became extinct. As for Queen Moo, she found asylum in Egypt, where she became the wife of the King.

Not the least noteworthy character-



F. A. Ringler Co., N. Y.

MEMORIAL TEMPLE TO PRINCE COH AT CHICHENITZA. RESTORED IN DRAWING BY DR. LE PLONGEON

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Just now there is a great demand for workmen. But is it a safe and solid demand or an artificial and misleading demand? The war period left us with a great housing shortage. Our railway equipment had run down, too. We had a new appreciation of good hard-surfaced highways, and we bonded ourselves for many hundred million dollars' worth of highway improvements. This in turn opened up new markets for automobiles, and we are right in the flush of supplying this demand.

All this brings a show of prosperity. We are patting ourselves on the back—and putting prices up a notch higher.

Again let us ask, is this apparent prosperity on a safe and sound basis?

Some day, perhaps not very many years hence, we as a nation shall be on a self-supporting and self-contained basis. We shall export little but tourists. In that day we shall care little about world price levels. Prices in this country will be the only things that count. We have within our continental and insular boundaries practically all the raw materials we need, and we could be practically independent of the world, although under such conditions our business growth would have to be slowed down somewhat.

Problems of the American Farm

WITH Mr. Kile's article *The Outlook* has begun a series of discussions of American farm problems and American farm resources. These articles will deal with both the opportunities and the difficulties of our farm population. Three of these articles illustrate their varied character:

Banking on Character

By George M. Rommel

tells the story of a farm loan system built on the honor of the men who operate it.

The World's Struggle for Fats

By Charles W. Holman

recounts the amazing demand for vegetable oils and the interplay of agriculture and industry in the solution of this problem.

Three Jews Who Are Helping Make Farming Pay

By Silas Bent

is an illuminating study of the application of economic science to the problems of farm marketing and farm finance.

Other farm articles will be announced in future issues.

But that day of self-sufficiency has not arrived as yet. We are at present so adjusted as to depend upon export to utilize a certain margin of our production. Cutting off this surplus, particularly at this time, when we are over-equipped with war-expanded production facilities, would mean a distinct slowing up in all lines. Let this take place, and all the veneer of apparent prosperity would be torn away in an instant. It would be seen, for instance, that a considerable share of the present demand for houses comes from those who have moved in from the country, like Mr. and Mrs. Farmer, to help build houses. A good share of the demand for automobiles and furniture comes from those who are getting high salaries and wages for designing, building, and selling these houses. And so on down the line. It is a regular house-that-Jack-built proposition. A stoppage any place in the line would tie up the whole procession. Obviously this is a dangerous sort of prosperity. It is so likely to blow up without much warning.

The thing that threatens—threatens ominously and near at hand—to interrupt what might otherwise be safe, sane, and solid prosperity, is this high price level, artificially maintained by labor and industry. These groups have marooned themselves on an island of high prices, so far as world trade is concerned.

It is cutting off our exports of manufactured goods. It has greatly cut down the purchasing power of the farmer. The channels of production and trade are not in proper working order. This temporary spurt of activity in building and related lines, coupled with a sort of secondary inflation reflected in increased activity at the banks, is not fooling the really broad-visioned business leaders.

Most business men and labor leaders are, unfortunately, so busy skimming the cream as fast as it rises that they haven't time to inquire as to what makes it rise, or even whether it will keep on rising. But there are many in positions of prominence here and there who recognize this price-relationship situation at its full significance as a pressing National problem. They see that it must be met at once in order to avoid ultimate catastrophe. And, furthermore, they realize that unless labor and industry correct this situation themselves there will be plenty of tinkers in the next Congress ready to make the necessary adjustments. And experience has shown that in the heat and turmoil of Congressional action the monkey-wrench and over-size sledge-hammer are frequently used, where the same result might be accomplished with less pain to all concerned by the use of more delicate and better-suited tools.

seemed quite convincing. Thus on the walls of the great temple at Chichen-Itza he found Maya hieroglyphs intermingled with others which were unmistakably Egyptian. Placing, as I did, photographs of the two side by side, it was impossible to distinguish between those which were on the banks of the Nile and those which were in the wilderness of Yucatan. One day I received from a friend in Burma a portfolio of photographs of sculptures and elaborate architectural decorations. This I took to Dr. Le Plongeon and showed it to him, whereupon he produced photographs of Maya sculptures and decorations substantially identical with the Burmese.

Still more striking were the linguistic and legendary resemblances. The very name of Maya was a case in point. The root, "Ma," signifies in the Maya language the earth, or a place; and it was thus used by ancient Indian sages. The mother of Gautama Buddha was named Maha Maya, and in the Indian epic "Ramayana" the name Maya is borne by a great warrior and explorer. Of course the goddess Maia is well known in Greek and Roman mythology, and it is significant that May-day festivals, including dancing around a ribbon-decked Maypole, have been practiced by the Mayas from time immemorial. The name or title Kan was borne by the ancient sovereigns of the Mayas, and Dr. Le Plongeon plausibly identified it with the familiar Khan of Asiatic countries. As for legendary lore, that of the Mayas bore striking resemblance to that of Asia and Europe. The story of Cain and Abel was unmistakably set forth in great colored cartoons on the temple walls. The story of the Noachian Deluge was a part of Maya tradition, even to the detail of forty days and forty nights of rain.



SEMI-RECLINANT STATUE OF PRINCE COH. DISCOVERED AND PHOTOGRAPHED AT CHICHENITZA BY DR. LE PLONGEON IN 1875

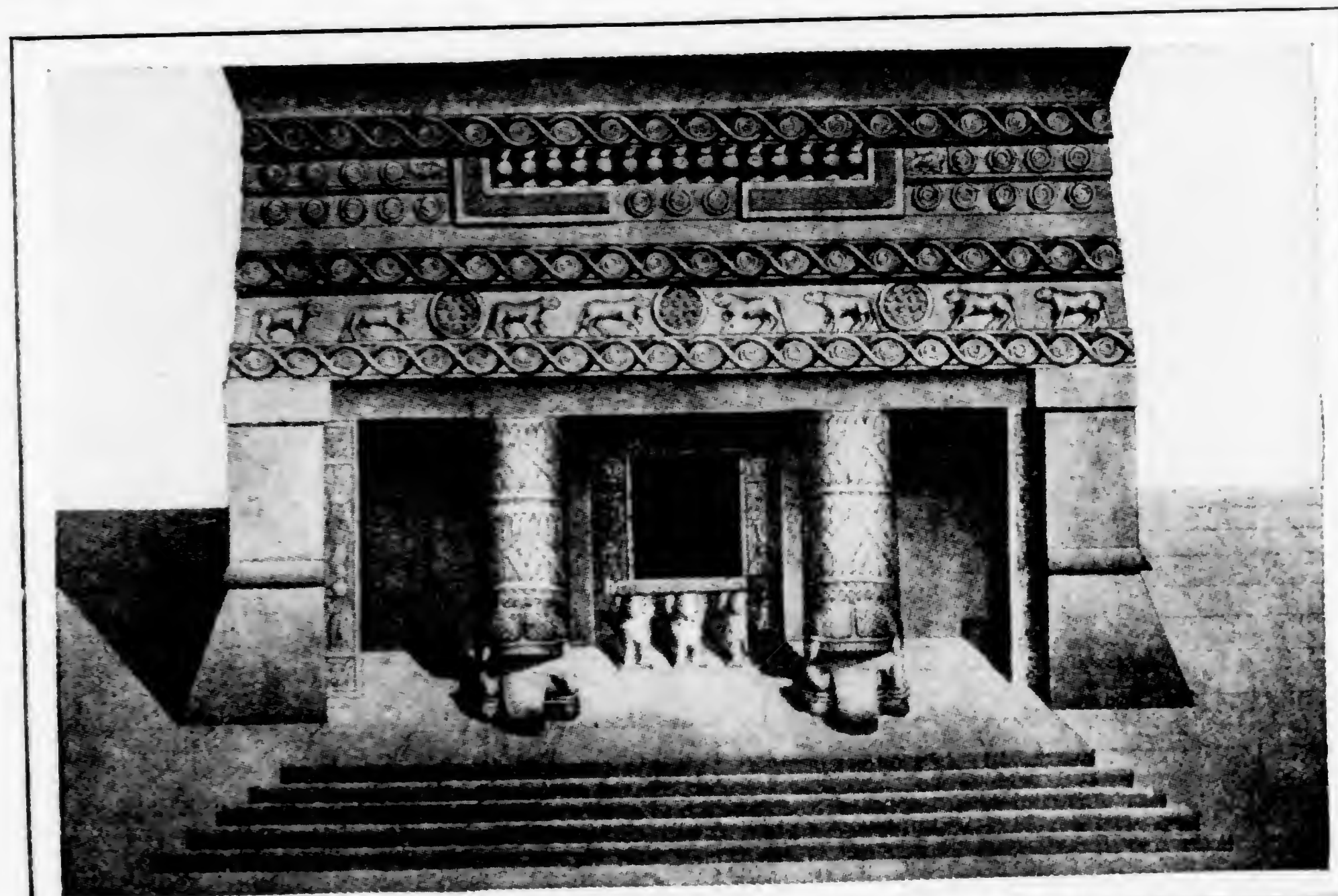
But, since these two Biblical legends are common to many other lands, still more impressive, to my mind, was the Maya tradition of Atlantis. This told of a great island in the middle of the Atlantic Ocean, called Mu in the Maya language, which was submerged by the convulsions of an earthquake shock some eight or nine thousand years ago. On the Pyramid of Xochicalco Dr. Le Plongeon found inscriptions telling that it was erected as a memorial of the lost island of Mu, and was made as a model of the sacred hill in that island—the sacred hill which Plato in his account of Atlantis describes as crowned with a temple dedicated to Poseidon.

Seeing that the Atlantis legend originated in Egypt, or at least was imparted by the priests of that coun-

try to Solon, and from him passed on to Plato, it was most interesting to Dr. Le Plongeon to observe that the inscriptions relating to it consisted of Maya and Egyptian hieroglyphs intermingled.

Another resemblance between the Mayas and the ancient Egyptians was in the fact that in both countries royal brothers and sisters were required by religious law to marry, and it was this custom which led to the great tragedy of Maya history. The famous Queen Moo (the name is pronounced to rhyme with "snow") was required to marry her brother Aac (the vowel sounded as in "dark"). But she refused, and instead married another brother, Coh (the name also rhyming with "snow"). In consequence, Coh was treacherously murdered by Aac, who admitted his guilt and was exiled from the royal city of Chichenitza, another brother, Cay (pronounced Kah-ee), who was the High Priest, prophesying that the crime would cause the downfall of the Maya Empire. Queen Moo built a great memorial to Coh in the great square at Chichenitza, where Dr. Le Plongeon found a recumbent statue of Coh and a stone urn containing what was believed to be his heart embalmed with red oxide of mercury, together with a carved stone talisman of Queen Moo's, which she placed there in order to link her destiny with Coh's in the future life. Later Aac began a war to regain the throne and to compel Moo to marry him. Moo was defeated and fled from the country, while Aac became a tyrant and was deposed and slain by his own people. Thus the Kan dynasty became extinct. As for Queen Moo, she found asylum in Egypt, where she became the wife of the King.

Not the least noteworthy character-



F. A. Ringler Co., N. Y.
MEMORIAL TEMPLE TO PRINCE COH AT CHICHENITZA. RESTORED IN DRAWING BY DR. LE PLONGEON

Retake of Preceding Frame

istic of Mayan sculptured and pictorial art, to which Dr. Le Plongeon called my attention, was its singular and invariable modesty in matters of sex. There was no such frank portrayal of the unclad human form as in the sculptures of Greece, and of course never a hint of anything like the astounding obscenities of Pompeii and of certain Indian temples—such as that which, according to Kipling, made even the redoubtable Mulvaney blush. A veritably Puritanical spirit seems to have prevailed, and this Dr. and Mrs. Le Plongeon found surviving at the present day; a fact which caused Mrs. Le Plongeon some innocent embarrassment. For reasons of convenience, efficiency, and safety she preferred while exploring the jungles to wear male attire. But for a woman to display her legs, clad in trousers or

knickerbockers, would have been regarded by Maya women as scandalous and would cause her and her husband to be regarded with aversion. So the little lady provided herself also with a skirt of mohair, which when there were no women about she wore rolled up snugly about her waist. But the moment a Maya woman hove in sight a touch of the fastenings let it fall so that it reached her ankles, and Maya modesty was saved!

Mrs. Le Plongeon was a gifted musician as a singer, as a performer, and as a composer, and she made a special study of Maya music, much of which she learned and committed to writing. Her mastery of some of their ancient songs and her sympathetic rendering of them greatly ingratiated her with the Mayas and convinced them that she, like her hus-

band, was a reincarnation of one of their own people of ages past. She also put into poetical form the legend of Queen Moo, which her husband had made the subject of a volume. She survived her husband for a number of years, and after his death was a frequent lecturer in New York City as well as a contributor to the periodical press.

Both Dr. and Mrs. Le Plongeon lived and died in entire confidence that in time their researches and discoveries would be recognized and appreciated by the world and that the remains of Maya civilization and culture would rank among the most interesting and instructive of all relics of past ages. What must be their sentiments in the Elysian Fields to-day at seeing Chichenitza and Uxmal regarded as "the Egypt of America"?

GETTING ABOUT IN RUSSIA

BY ARTHUR RUHL

THE best proof that the Russian railways are not in a state of "collapse" is that the enormous amounts of supplies set down at the Black Sea and Baltic ports by the ships of the American Relief Administration were actually delivered.

Thousands of car-loads were transported, many of them in the dead of winter, over distances corresponding to those between New York and the Mississippi Valley—the longest haul was of 1,400 miles between Novorossisk, on the Black Sea, and Ufa, near the Urals—and the food got there and the starving were fed. It was not done without sacrificing other transportation needs nor without constant hammering by the A. R. A. itself, but it was done.

The railways are in bad shape nevertheless. And, in spite of new locomotives from Sweden, new cars and locomotives made or repaired in Russia itself, a good deal of work on the roadbed, and a very noticeable improvement in the passenger service here and there, it is doubtful whether the total gain is more than keeping pace with the total depreciation.

Mountains of figures, most of them of doubtful accuracy, have been printed to prove this or that, and I shall quote here only those given by the Commissar of Transportation, Dzherinsky, at the All-Russian conference of transport workers last October—not as anything complete, but merely as indicative of conditions which the responsible Soviet authorities frankly admit themselves. According to Dzherinsky, Russia had then 7,488 locomotives instead of the 20,320 of 1913, and of these the per-

centage of damaged ones had increased from 17 to 62.7. Some such measure as this applied all along the line will suffice to suggest the general state of things.

As an inspector from the A. R. A. the writer traveled all over European Russia, from Petrograd in the north to the Black Sea ports of Odessa and Theodosia in the south, and from Kiev in the west to Orenburg and Ufa on the Siberian border. He slept between sheets in luxurious International *wagon-lits* and bunked on wooden benches in third-class cars packed with people, their lunches and tea-kettles. The observations made here are those of a practical traveler—not statistics, but a rough picture of what "getting about in Russia" is like in these days.

The American reader must remember that travel in Russia even in the "good old times" was very different from what it is on the main lines in our own country. It was always comfortable enough, but the Russian notion of comfort, like that of most of Europe, was very different from that to which our own spoiled bodies are accustomed. Many will recall the shrieks of anguish that rent the air, at the time of the mobilization on the Mexican border a few years ago, from mothers whose sons were compelled to travel in first-class upholstered coaches instead of Pullmans. In France, as the sons learned later, soldiers were transported in the same cars as their horses.

There were sleeping-cars and dining-cars in Russia in the old days, but anybody but a grand duke was content, generally, to snuggle into the

corner of an ordinary first or second class compartment, wrap a shawl about his legs, turn up his coat collar, and snooze until morning. Most people carried lunch-baskets, and the humbler sort tea-kettles. At every station of any size there was a buffet and that delightful Russian invention, the *kipiatok* or hot-water tank, from which it was always possible to fill your kettle for tea. The trains poked along in leisurely fashion, stopping for a quarter or half an hour every now and again. People tumbled out, filled their tea-kettles, bought fruit or honey or fresh butter and cheese from the peasants who had come to the train for that amiable purpose. The warning bells rang: first bell; five or ten minutes later, another; third bell—and everybody, in great haste and lugging his purchases, hurried aboard again. Then followed tea; lunches shared with the others in the same compartment. It was something like stage-coaching or traveling with a caravan.

There is plenty of this sort of traveling in Russia to-day, and that sleeping-cars are almost extinct and that the locomotive burns wood and the train may be half a day late troubles the passengers not at all. In summer, when the windows are open, and nobody needs to bother about keeping warm, and there are melons and apples and things to buy at every station, even crowding into a third-class car is no particular hardship.

It would have been quite possible last summer to travel from Moscow to any of the southern Russian cities and to "live on the country" even in the famine neighborhoods. For, al-

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ON

THE CALAKMUL ARCHAEOLOGICAL EXPEDITION

BY

SYLVANUS G. MORLEY

**STAFF MEMBER, DIVISION OF HISTORICAL RESEARCH
CARNEGIE INSTITUTION OF WASHINGTON**

**IN THE ASSEMBLY ROOM OF THE ADMINISTRATION BUILDING
OF THE INSTITUTION, SIXTEENTH AND P STREETS, NORTHWEST**

CALAKMUL IS ONE OF THE MOST IMPORTANT KNOWN MAYA SITES. IT IS LOCATED IN THE SOUTHERN CENTRAL PART OF THE STATE OF CAMPECHE, MEXICO. ITS DISCOVERY RANKS IN ARCHAEOLOGICAL AND HISTORICAL INTEREST WITH THE DISCOVERY OF THE ANCIENT SITE AT UAXACTUN IN GUATEMALA IN 1916. THE CIVIC AND RELIGIOUS CENTER OF CALAKMUL WHERE THE GREATEST CONCENTRATION OF ARCHITECTURAL REMAINS AND SCULPTURED MONUMENTS ARE FOUND COVERS AN AREA HALF A MILE SQUARE

PERHAPS THE GREATEST IMMEDIATE VALUE OF THE DISCOVERY IS THE OPENING UP OF THIS SCIENTIFICALLY HIGHLY SIGNIFICANT REGION IN THE UNEXPLORED RAIN FOREST OF NORTHERN GUATEMALA AND SOUTHERN YUCATAN, A NO MAN'S LAND BETWEEN THE OLD AND THE NEW MAYA EMPIRES

This lecture is open to the public, but tickets of admission will be required

Owing to limited seating accommodations, Dr. Morley will deliver his address twice, for the convenience of those who may wish to hear him

The dates are as follows

THURSDAY EVENING, JANUARY 5, 1933, AT 8.30 O'CLOCK

FRIDAY AFTERNOON, JANUARY 6, 1933, AT 5.00 O'CLOCK

Upon application tickets may be obtained without cost for either occasion, to the extent of the limited seating capacity of the Assembly Room

ARCHAEOLOGY

Ancient Earth of Mexico Reveals New Treasure Tomb

Disks and Belts of Beaten Gold Among Valuable Articles Taken From Sepulcher Discovered by Indian Farmer

THE ANCIENT EARTH of Mexico has revealed another rich old Indian treasure tomb. It is second only to the great archaeological discovery at Monte Alban that in January astounded the archaeological world.

Beaten gold, carved images, green jade, and obsidian objects were unearthed from this new-found tomb in a hitherto uncharted archaeological site. The site is at Texmelincan, one hundred twenty miles south of Mexico City, in the State of Guerrero. The area about the tomb is covered with archaeological mounds, concealing no one knows what manner of buildings and remains.

An Indian farmer discovered the tomb. The rare and beautiful articles were removed secretly into the safe keeping of the Mexican Department of Archaeology.

Outstanding among the discoveries is a great disk of beaten gold, eight inches in diameter. The disk has a hole in the center. On the disk are carved two intertwined plumed serpents, familiar and important symbols in ancient Mexico. The plumed serpents are portrayed with fifty-two vertebrae, probably symbolizing the fifty-two years in the Mexican century. The head of a warrior protrudes from each serpent's gaping jaws.

Jade Necklace

Among the other rich Indian adornments in the tomb are two belts made of thin gold sheeting. These beaten-gold belts are two feet long and three inches wide. A necklace of seventy-one unusually fine carved green jade beads is another rare ornament. There are also large gold earrings, a necklace of thirty-two hollow gold beads, many pieces of carved jade, three necklaces of shell and stone beads, twenty-one copper bells, and four huge obsidian earrings, painted red.

From the tomb also were taken three onyx vases, a stone idol, four finely polished pottery vessels, apparently Toltec, and much plain pottery, some of it filled with red mercury paint and also blue mineral.

Some clues to the identity of the people who made the tomb have already been noted among the tomb objects. Serpent symbols, as well as the carved pottery, suggest the Toltec style. Symbols of Xipetotec, god of the flayed, adorn some of the pieces. Eleven copper rings are carved with Xipetotec symbols.

The nearest important ancient city to the scene of the tomb discovery is Xochicalco. This large ruin is noted for its plumed serpents and its "Toltec-Maya" style, though it is far from the Yucatan Peninsula, where the Mayan civilization flourished.

Gold-Lined Skulls

Craniums lined with gold-leaf, and gold handles that appear to belong to scepters are strange and shining objects also taken from the tomb. The curious device of lining craniums with gold leaf is said by archaeologists to have been an ancient custom among Indians in the State of Oaxaca, to the east of Guerrero. Gold leaf to the weight of a pound has been gathered up.

The Indian farmer who made the Guerrero tomb discovery found two fine stone corn grinders among the objects in the tomb. From this it appears that some of the occupants, buried with their rich possessions, were women. The number of burials has not yet been determined.

Some of the objects from this new tomb are pronounced unique. There is, for example, a miniature turquoise mask of the wind god Ehecatl. There is also a bird's head made of turquoise, and many fragments of scattered mosaics.

Of special and absorbing interest to science are the hieroglyphs on some of the objects. These picture writings and three onyx vases stand out as clues which may link the Toltec, Mixtec, Huastec, Maya, and other great cultures in south-central Mexico.

The Mexican archaeologist, Enrique Juan Palacios, stated that ancient Indian inhabitants of the Guerrero region were versed in the Toltec calendar.

First Aircraft Lands At Chichen Itza Ruins

A PERFECT LANDING with an autogiro has been made by Capt. Lewis Yancey on the plaza front of the ruined Temple of the Warriors at Chichen Itza, Yucatan, says a report received by the Carnegie Institution of Washington. Capt. Yancey flew from Merida.

This is the first time in history that an aircraft has landed at the famous Mayan city of Chichen Itza. It is believed that success with the autogiro opens up new possibilities for reaching ruins in the tropical forests. Two years ago, Col. and Mrs. Charles A. Lindbergh, accompanied by Dr. A. V. Kidder, head of the Carnegie Institution's archaeologists, flew over Chichen Itza and took air photographs of the city, but ground conditions were not suitable for landing.

Dr. Sylvanus G. Morley, who reported the safe arrival of Capt. Yancey at Chichen Itza, said that the autogiro was greeted enthusiastically by staff members of the Carnegie Institution who are now assembled at Chichen Itza to confer on archaeological research in the Mayan country.

Science News Letter, February 27, 1932

Oct 4, 1929

TWIN CARBON

~~Carbon is the latest chemical element to be shown to have a twin. Last winter two California physicists showed that oxygen, long supposed to be single, was not only double, but triple. Now Dr. Arthur S. King, of the Mount Wilson Observatory, and Dr. Raymond T. Birge, of the University of California, have found a kind of carbon that is heavier than the ordinary form. Carbon is one of the most essential elements in living matter.~~

~~These experimenters heated carbon in a vacuum in an electric furnace to a temperature around 5,000 degrees Fahrenheit. When the light that is emitted was analyzed with a spectroscope, the usual bright bands of the spectrum appeared, including a very prominent red one. Close to this, however, the photographs showed another, very faint, and previously unknown.~~

~~Ordinary carbon is of mass 12, in the scale used for measuring the mass of the atoms. Dr. King and Dr. Birge announce that the new band can be explained by the presence along with ordinary carbon of another kind, or isotope, of mass 13. They are unable to estimate the relative proportions of the two kinds, but the heavier isotope must be present in very small quantities, for the band is hundreds of times as faint as the strong one.~~

~~Isotopes, or forms of the same element having different weight atoms, were first discovered in connection with studies of radium and similar elements. A few years ago Dr. F. W. Aston, of England, proved that a number of common elements consisted of as many as six or more isotopes. Last year Dr. W. F. Giaque and H. L. Johnstone, of the University of California, following up a lead given by Dr. King, showed the existence of three oxygen isotopes weighing 17 and 18, as well as the ordinary kind, weighing 16.~~

EXPLORATION BY COLONEL LINDBERGH FOR LOST MAYA CITIES

WHEN Colonel Lindbergh and Carnegie Institution archeologists fly over the jungles of northern Central America and Mexico in search of lost Maya cities, they will be adding a new method to the scientific exploration of ruins of one of the world's most interesting civilizations.

Buried beneath almost impenetrable tropical forests in the Yucatan Peninsula, Guatemala, Honduras and British Honduras, there are the remains of populous cities that flourished long before the time of Columbus. Many of these abandoned cities, rich with artistic temples and monuments, lie hidden, unseen by modern eyes. On foot, tediously hacking a path through the tangled growth, an explorer might pass within a few hundred yards and yet not find the ruins. From the air, a few hours' flying may reveal not one, but several, hitherto unmapped and possibly totally unknown Maya cities.

Such is the expectation of Colonel Charles A. Lindbergh and of Dr. Oliver Ricketson, of the Carnegie Institution, who will fly with him in a Pan-American Air-

ways airplane. Their base at Belize, British Honduras, is nearly in the center of the region that from before the time of Christ until about the year 1500 the Maya inhabited. To-day the descendants of the race that showed such accomplishments live in the same area in a primitive state, unmindful of their glorious past.

Colonel Lindbergh's aerial photographic experience obtained on recent flights over the southwest will prove useful on the projected flying over the Maya country. It is expected that he will act as photographer as well as pilot and that Dr. Ricketson will do the mapping that will allow land parties to reach and excavate the cities that are discovered.

The cooperation between the Pan-American Airways and the Carnegie Institution of Washington links two organizations that are pioneering in the rediscovery of Central America. The projected airlines of the Pan-American Airways pass near such cities as Chichen Itza, Copan and Etzna, which archeologists of the Carnegie Institution have excavated and studied.

The airplane in Middle America can duplicate the remarkable feats achieved in England, where O. G. S. Crawford, air corps observer, has discovered Roman towns and trenches by means of air photography. These trenches and streets were long since plowed over by British farmers and were presumably lost forever to the knowledge of historians, but where the ground was once disturbed, the texture of the soil has been altered, and the crops planted there are apt to be greener and more luxuriant. The air camera or the keen eye of the airplane observer can often trace the exact plan of the vanished town or fortress. By some such method the stone highways which the Maya built to connect their important cities can probably be traced.

It is only a few years ago that the existence of these smooth stone roads, 30 to 60 feet wide, was discovered. Dr. Thomas Gann, who found sections of the roads in the forest near Coba, concluded that the Mayas could not have needed such highways for traffic, since they had no wagons or beasts of burden and since they would have found dirt roads suitable for their long journeys. The roads, he believes, must have been laboriously constructed over long distances between religious centers for use by the religious processions of priests, votaries and sacrificial victims.

One highway for which search will be made is the road which Dr. Gann believes must have stretched from Coba to Cozumel Island to which the Maya made religious pilgrimages. Another may have led from Coba to Chichen Itza, famed religious city, sacred to the deity known as the Plumed Serpent.

The airplane archeologist has an opportunity to "discover" Middle America in pioneer fashion. The sixteenth century Spaniards who discovered Yucatan and the Aztec cities wrote excited, glittering accounts of gold and jewels and beautiful women and marble palaces. But their tales were considerably discounted by sober stay-at-homes, who

Lover

reflected that the Spaniards were not calm scientific observers and were merely trying to prove the importance and worth of their voyage of conquest.

Ninety years ago, an adventurous American, John L. Stephens, went into the Yucatan jungle and proceeded to discover the Indian cities again for the world at large. His verdict on the bas-reliefs and paintings which adorned the official buildings of the ruined cities was that "in justice of proportion and symmetry they have approached the Greek models."

After Stephens came a long series of archeologists, all of whom have been kept busy discovering the Mayas and the Aztecs. There are 1,200 sites in Mexico alone which are pronounced of archeological importance, and no one can guess how many more lie buried in inaccessible corners of the region.

The airplane offers a rapid method of discovering this much discovered country. More than that, it offers the possibility of revealing plans and explaining mysteries which could not be solved otherwise.



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EWING GALLOWAY

RUINS OF AN ASTRONOMICAL LABORATORY OF THE ANCIENT MAYA INDIANS AT CHICHEN, YUCATAN

It remained for chicle hunters to uncover the relics of this remarkable but long-forgotten race. Many persons are surprised to know that the Mayas occupied the Yucatan Peninsula as early as the fifth century A. D., there building up a civilization rivalling that of the Aztecs. Dr. Sylvanus Griswold Morley of the Carnegie Institute calls the calendar system of the Mayas one of the greatest intellectual achievements of ancient America.



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Retake of Preceding Frame

THE DISCOVERY OF RUINED MAYA CITIES

IN discovering four ruined Maya cities dotted on the great unexplored area of the Yucatan peninsula of Mexico, the airplane flights of Colonel and Mrs. Charles Lindbergh and Carnegie Institution archeologists have given a better conception of the line of growth of the ancient Maya civilization.

The newly discovered cities lie in a line stretching northeastward from the Old Empire region of the Maya, located largely in what is now the state of Guatemala, where the civilization emerged about the time of Christ. The newly found ruins connect this older area with the New Empire region, on the north end of Yucatan peninsula. Chichen Itza is the outstanding example of this New Empire culture.

Flying over unmapped dense tropical jungles, the Lindbergh party sighted three ruined cities definitely determined to be "new." A fourth city, one of the largest found, may be a new discovery, but it may prove to be one seen by Dr. Thomas Gann some years ago in the vicinity of Lake Bacalar.

Many months and perhaps years will be required to investigate and explore the cities located from the air. Many weeks of hard travel by land will be necessary to place land parties at the ruins. But when the broken temples are rescued from the enveloping vegetation, there

will be available a better idea of the spread of the Maya, who more than fifteen centuries ago rose from primitive simplicity to a complex state with highly developed religion, government and monumental architecture. How and when the center of Maya culture shifted from the Old Empire region to the New Empire has been one of the unanswered questions. The connecting cities now found will probably supply the answer.

Nearly as exciting to archeologists as finding new ruins is the fact that no cities were found in the area of the Mexican state of Campeche, which was surveyed on the second day's flight from Merida southward. Coupled with the discovery of the ruined cities farther to the east, the absence of Maya settlement sites in the western part of the Yucatan peninsula is significant in explaining the spread of the Maya civilization.

The four discovered ruins are located in flat country. From the air the raised temple mounds could be seen twenty miles away in some cases. But giant trees and dense vegetation rise about a hundred and fifty feet to shroud the glistening white stones with which time has dealt severely. Only by flying low over the area could the central temples of the cities be seen and studied from the speeding airplane.

The first ruined city, seen on the first day's flight, is located in the southeast corner of the state of Campeche, some fifty miles from the Guatemalan boundary line. Situated in the heart of uninhabited jungles, far from lakes of any kind, it will present a difficult objective to land parties.

Of the three cities discovered in Quintana Roo during the most fruitful fourth day flight, two are located sufficiently near lakes to allow early exploration by parties transported by air to these lakes. The city near Lake Bacalar is probably more extended in area than the others. The last city discovered and the one nearest the coastal ruins of Tulum is the least accessible of the three due to the absence of water near it on which an airplane might land.

Dr. A. V. Kidder, director of the Carnegie Institution's archeological work, who flew on the last three days, was disappointed in not being able to see from the air traces of great stone highways connecting Maya cities.

The flights over Coba on the fourth and fifth days of the joint Carnegie Institution and Pan-American Airways explorations were of historical interest because the city has been seen by white men on only two occasions before this time. In 1926 Dr. Kidder and a companion, J. Eric Thompson, now of the Field Museum, visited the city, and not until last February when Colonel Lindbergh located it during a Pan-American Airways trail-blazing flight was it seen again by a white man.

Dr. Kidder indicated on his return to Washington that air travel will become a routine part of the Carnegie Institution's archeological work in the Maya region as soon as funds can be secured for a light amphibian airplane and equipment. With the use of Pan-American Airways bases at Cozumel Island and Belize, a two-year program of detailed aerial exploration could be carried out for about \$50,000. Colonel Lindbergh will act as an adviser to the archeologists on the aeronautical aspects of the work.

ARCHAEOLOGY

**Court Decision Spurs
Search of Mexican Ruins**

THE MEXICAN Supreme Court has ruled that the country's archaeological sites are under jurisdiction of the federal government, and not that of the individual states.

Upheld by this decision, federal government archaeologists will proceed at once to make excavation at Monte Alban where the spectacular discovery of a treasure tomb was reported last January. Alfonso Caso, government archaeologist and discoverer of the Monte Alban tomb, has already gone to the site accompanied by a staff consisting of Eduardo Noguera, Juan Valenzuela, Horacio Herrera, Augustin Garcia, and six archaeology student assistants.

A three times greater appropriation is available for the coming season at Monte Alban. More tombs are to be excavated. These appear to be almost innumerable, the ancient necropolis seeming to have had a vast population of dead. The surveying and stratigraphic studies will be resumed, and the archaeologists hope to learn something of the relationship between Monte Alban and the Maya region.

At the ruins of a Zapotec fortress city called Quiengola, archaeologists will start other explorations. Quiengola has never heretofore been studied.

The coming of the dry season has been awaited in order that explorations at Texmelincan, in the mountains of

Guerrero, may be resumed. At the Toltec city of San Juan Teotihuacan, excavation of the "Avenue of the Dead" will continue.

At the Mayan city of Chichen Itza, in Yucatan, Mexican government archaeologists will continue to explore the interior of the city's highest pyramid and temple. This is the Temple of Kukulcan, the Bird-Snake. Within the 90-foot pyramid on which the temple stands, a smaller temple-topped pyramid was found last season. This year tunnels will be bored to fix the shape and size of the inner pyramid and to determine whether there may be still more structures hidden within.

At Cholula, where the largest pyramid in the world is located, excavations were not interrupted by the rainy season, because all the work has been under shelter. Innumerable smaller structures have been found inside the great pyramid, as if several city blocks of minor buildings had been covered up.

Science News Letter, October 29, 1932

PLANT PATHOLOGY

**New Beet Variety
Resists Disease**

US. NO. 1. That is the name of the new beet variety which the plant breeders of the United States Department of Agriculture have just announced. It is a heavy blow against the beet beet which is a pest of the western beet industry. The new variety is a result of the work of the entomologists of the

a member of the National Academy of Sciences.

Gibbs also received many honors, first in Europe and then in his own country. He was elected to membership in the Royal Institution of Great Britain, the Royal Society of London, the Bavarian Academy of Sciences, the Dutch Society of Sciences (Haarlem), the Royal Academy of Amsterdam, the Bavarian Academy of Sciences, the Cambridge Philosophical Society, the Royal Prussian Academy of Berlin, the Royal Society of Sciences (Göttingen) and the London Mathematical Society. He also received the Copley Medal from the Royal Society of London, and he was awarded the Rumford Medal by the American Academy of Arts and Sciences. The universities of Erlangen, Christiana and Princeton, as well as Williams College, bestowed upon him honorary degrees. He was a member of the National Academy of Sciences.

What of the families of Hill and Gibbs? Hill was of English and Huguenot descent. His father and his grandfather were artists, apparently in no way distinguished. When he was eight years of age his father moved from New York City to a farm at West Nyack, N. Y., where Hill spent nearly all his life.

Gibbs was of English ancestry and descended from a family distinguished for its scholars. On his father's side there was an unbroken line of six college

graduates, five of whom were graduates of Harvard and one a graduate of Yale. Among his mother's ancestors there were two Yale graduates, one of whom, Jonathan Dickinson, was the first president of the College of New Jersey. Gibbs himself was a graduate of Yale and spent the remainder of his life, except for a period of study in France and Germany, as a professor in Yale.

Perhaps nothing in the lives of Hill and Gibbs is more interesting and instructive than their education. Hill graduated at Rutgers College and Gibbs at Yale, as many other boys before and since have done. It is probably safe to assume that they received as much inspiration and acquired as much knowledge from their courses as does the average student. But they both did something that was and is quite exceptional. They read the masters in science. While yet an undergraduate, Hill read carefully such great works as those of Lagrange, Poisson, Laplace, de Pontécoulant, Legendre and Euler, all of whom were French. Gibbs studied the works of Poisson, Cauchy, Fresnel and Clausius. Whether it was the qualities of their minds that drew Hill and Gibbs to the masters or the influence of the masters that inspired them to great achievements we can not know. But at least they understood the masters and took pleasure in following the paths they had trod.

F. R. M.

AN ANCIENT MEXICAN CIVILIZATION

A STADIUM with a seating capacity of at least 8,000, moat-encircled ruins of a town and a towered, twelve-room building are among the remains of an ancient civilization buried in the thick jungles of Campeche in southern Mexico, a land now traversed chiefly by wandering chicle hunters and found in a reconnaissance just reported by archeologists of the Carnegie Institution of Washington.

The party, led by Dr. Karl Ruppert,

entered a region of dense forests, hitherto penetrable only with pack mules, by airplane and located the ruins of twelve towns which had flourished long before the discovery of America and, presumably, were built by close relatives of the Maya Indians.

For the most part, these were small places with few substantial buildings. The town in which the stadium stood was an outstanding exception. There was a

level area, about 60 by 70 yards, surrounded by a continuous mound, which was broken in four places for entrances. An examination of the enclosing wall showed that it had been lined on the inner side by a series of from 18 to 20 steps. These constituted the seats of the ancient stadium.

The place was probably used, the archeologists believe, for religious ceremonies and ball games. A game in which a solid rubber ball was bounced back and forth from the hips of the players with the object of getting it through a ring, as in present-day basketball, was very popular among the Mayas, and contests attracted large crowds. The game with many variations, extended northward as far as New Mexico and Arizona, and in central Mexico, had the patronage of the Montezumas. Even in the Mayan heyday, however, the Campeche region was probably bush-league territory. The ruins around the ancient stadium indicated the largest town in the region. The remains of several large buildings were made out, each with elaborate, stucco-decorated façades.

Not far from a little lake in the same general region, the explorers came upon the ruins of another town, now represented only by a few low mounds except for the remains of a single remarkable structure. This latter made up one side of the town plaza. It has twelve large rooms, and three towers—one at either end and one in the center. This last was more than 50 feet high. All the towers were semi-circular and had "false stairways" which were ornamented with great stucco masks. The building might have been roughly similar in appearance to a medieval castle. The moat-encircled town, adding still more to the medieval impression, was a few miles from the same lake in a different direction.

The number of ruins still discernible indicate that the region must have been at one time a flourishing population center. Difficulty of access has deterred previous explorers. The Carnegie party found, however, that several of the mounds had been opened by chicle hunters in search of buried treasure.

Dr. George Stromsvik, of the Carnegie archeological staff, reported the finding of another large ball-court in the ruins of the ancient Mayan city of Copan in Honduras. This was presumably a "big league" bowl where star athletes bumped rubber balls back and forth before cheering crowds more than a thousand years ago. Excavations show that it was the third similar stadium on the same site. It consisted of a long, rectangular playing area bounded on either side by a low, vertically faced bench from which sloping surfaces rose to a second vertical wall. On each wall were mounted three great stone parrot heads. All these heads had fallen down. It has been possible, however, to locate their original bases and they will be replaced. The floor of the playing-court was paved with flat stones. These have been distorted by pressure of tree roots, and it will be necessary to relay them.

Along one wall was found a band of hieroglyphic inscriptions from which it is hoped to find the approximate date when the stadium was built. One incised stone in this band was removed, and the archeologists found on its back another inscription showing that it had been taken from another ball-court on the same site. They found a date which they interpreted as indicating that the old court had been in use for 260 years before it grew too antiquated for the enthusiastic fans of ancient Copan.

THOMAS R. HENRY

Jaguar God Was Worshipped In Peru and Central America

Close Similarities in the Monuments of This Cult Point to Contact Between Widely Separated Peoples

GOD was a jaguar to the Maya of Middle America thirteen hundred years ago, and at the same time the Indians of Peru worshipped a jaguar deity. Close similarities in the monuments of this cult in these widely separated places argue a close cultural contact between the two peoples, Dr. Herbert J. Spinden, curator of prehistoric and primitive art at the Brooklyn Museum, told the American Anthropological Association. The worship of a jaguar god seems to have originated in Middle America and spread southward, Dr. Spinden said. In exchange, the South American Indians gave their Mayan religious instructors such cultural elements as metal-working, which they had not had previous to that contact.

Said Dr. Spinden:

"Not only was the prowling beast of the jungle put in charge of the sun, moon and stars while he gradually assumed a human guise as principal deity both for the early Mayas and for the Peruvians of corresponding or slightly later age, but such elements of his regalia as a sun-disk shield with four serpent rays are found on important monuments in the two centers of highest pre-Columbian civilization. So unusual are these ideas of religious symbolism that it is inconceivable that they could have happened twice in an independent yet simultaneous evolution . . .

Concentrated Powers

"Dr. Tello, the Peruvian archaeologist, has demonstrated that Viracocha, the sky god of Peru, is essentially a humanized feline, although his body is enriched by the addition of serpents as well as by elements drawn from birds and other animals, perhaps to indicate that in him are concentrated all the natural powers, exemplified separately by the various creatures of the earth, sea and air."

Other religious symbols, common to the two cultures, attribute to the sky god power over all creatures: fruits attached to his body, and the sun disk

faces with plants between the serpent rays. Very close parallels noted by Dr. Spinden in both Peru and Mexico are the humanization of the centipede, the scorpion, the snail and the owl as warriors, through the device of attaching the animal body to the human body carrying shield and weapons.

"It appears," continued Dr. Spinden, "that subsequent to the penetration of Peru by Maya religious symbolism, which must probably be dated in the fifth and sixth centuries of the Christian era, there was a strong counter-movement which brought metal-working, an art not known to the early Mayas, northward into Central America, while in the twelfth century of our era there was a cultural wave that spread the peculiar war cults of the Toltecs not only southward to Peru and Argentina, but also northward into the area of the moundbuilders of the Mississippi valley, with the ultimate influence reaching almost to the ends of the New World."

Science News Letter, January 5, 1935

ARCHAEOLOGY

Only One Building Standing In American Pompeii

Dr. Morley Makes First Detailed Report of Newly-Found Calakmul, Estimated to Be Fifteen Centuries Old

A VOLCANO wrecked Pompeii; tropical plants and trees with incredibly strong fingers pulled down the ancient American city of Calakmul.

In the first detailed report on the exploration of Calakmul, new Mayan city discovered in southern Yucatan, Dr. Sylvanus Morley of the Carnegie Institution of Washington tells of the complete ruin of a once mighty Indian metropolis.

In the entire city, the expedition found just one building standing, though on every side were great piles of fallen stone, bearing testimony to the former size and importance of Calakmul.

The architect and surveyor of the expedition John S. Bolles, made a surveyed map of the center of the city, where civic and religious buildings were clustered. This area is found to be one and one quarter miles long and half a mile wide. Beyond it, smaller mounds and pyramids extended into suburbs of unknown dimensions.

The expedition counted 103 stone monuments, the greatest number ever found in any Mayan city. Deciphering dates on forty-five of the stones, Dr. Morley established the period of Calakmul's grandeur. It was, he reports, a city of latter years of the Old Mayan Empire. According to one school of archaeologists the dates are translated into our calendar as the years 364 to 551 A.D. Another method of reading the dates gives a correlation more than two centuries later.

The explorers found an ancient quarry where the city builders went for stone. Two large blocks of stone, partially quarried out by long-forgotten workmen, may still be seen there.

In one court, the explorers came upon a flat outcrop of limestone, twenty-one feet by fifteen feet, on which Mayan sculptors had carved a scene of six prisoners, bound with ropes. To photograph this rock, the expedition staff erected a platform seventeen feet above the ground.

From the well-known Mayan city of

Chichen Itza in northern Yucatan, it is only about 125 miles to Calakmul by straight air-line. But the Carnegie expedition reached the site from Chichen Itza by a route three times that distance, traveling by train, sail boat, motor boat, platform cars drawn by mules, truck and finally journeying the last seven miles with a mule-train into the depths of the forest. The trip took nearly a week.

The Carnegie Institution believes that the most important result of the expedition may be the opening up of this no-man's-land between the Old and New Empires of the Mayan Indians. The reason for the downfall of the Old Mayan Empire is still one of the mysteries of ancient America.

Science News Letter, August 20, 1932

PHYSIOLOGY

Goldfish X-Rayed to Show Development of Pigment

FORTY-SEVEN little goldfish have been given X-ray tests to shed light on the little-understood subject of the cause of the formation of pigment-car-

ENTOMOLOGY

New Gypsy M Area Found in

ENTOMOLOGISTS of the U. S. Department of Agriculture are preparing to cooperate with the Pennsylvania Department of Agriculture and the State Department of Forests and Waters in a campaign to wipe out a newly-discovered infestation of gypsy moth in the mountains near Pittston.

This insect, introduced originally from Europe, has for years been a pest in New England, and at one time threatened to wipe out some of the finest forest and park trees in that region. The present outbreak in Pennsylvania is

ARCHAEOLOGY



A GREAT MAN OF CALAKMUL

A fine sculptured portrait of some unknown ruler or priest, set up by the Mayan Indians in Calakmul, in the year 472 A.D., or 731 A.D.—according to different readings of the date. The important Mayan was portrayed wearing a tall headdress and carrying a spear in his right hand. Carnegie Institution explorers found the large sculptured monument lying flat on its face. In this position, the delicate carving had been protected from the erosive action of the elements through more than a thousand years.

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Retake of Preceding Frame

in a region far removed from present centers of civilization. Because the carvings which remain are exposed to the disintegrating effects of the humid forest, the Guatemalan government sanctioned the removal of some of them. Half were to be sent to Guatemala City and half to be loaned to the University of Pennsylvania Museum.

The carving which is expected to attract greatest attention is a lintel from the doorway of a Mayan temple. Striking features of this Indian masterpiece are described by Dr. J. Alden Mason, archaeologist of the Museum who was with the party in the field. The lintel measures 29 by 24 inches and is of buff-colored limestone, Dr. Mason states. Almost the entire surface is covered with hieroglyphics and groups of Mayan Indians. Two of the figures are in full round carving, the others in high relief.

The poses are naturalistic and Grecian in quality, Dr. Mason says. Textile designs are clearly portrayed. Even the tasseled fringe of an altar cloth is carefully shown. Some of the Indians in the groups hold in their hands jars, fans, and unidentified objects. Some still have the ornamental headdresses of which the Mayas were so fond, though time has obliterated part of the carving. So fine is the detail that Dr. Mason declares: "Study of these figures will add tremendously to our knowledge of Maya ethnology."

Six dates on the lintel can be deciphered. All fall within a period of eight years, and according to the correlation accepted by Dr. Mason the latest of the dates would be Dec. 2, 757 A.D.

Science News Letter, January 2, 1932

ARCHAEOLOGY

Jungle Ruins Yield Mayan Masterpiece

A MAGNIFICENT stone carving, the work of some unknown Indian Phidias, has been safely brought from a ruined Mayan city deep in the Guatemalan jungle to be displayed at the Museum of the University of Pennsylvania. The carving has been pronounced by some critics to be the finest known specimen of Mayan art in stone.

The sculpture is one of the fruits of the recent Eldridge R. Johnson Expedition to the old Mayan city of Piedras Negras in Guatemala.

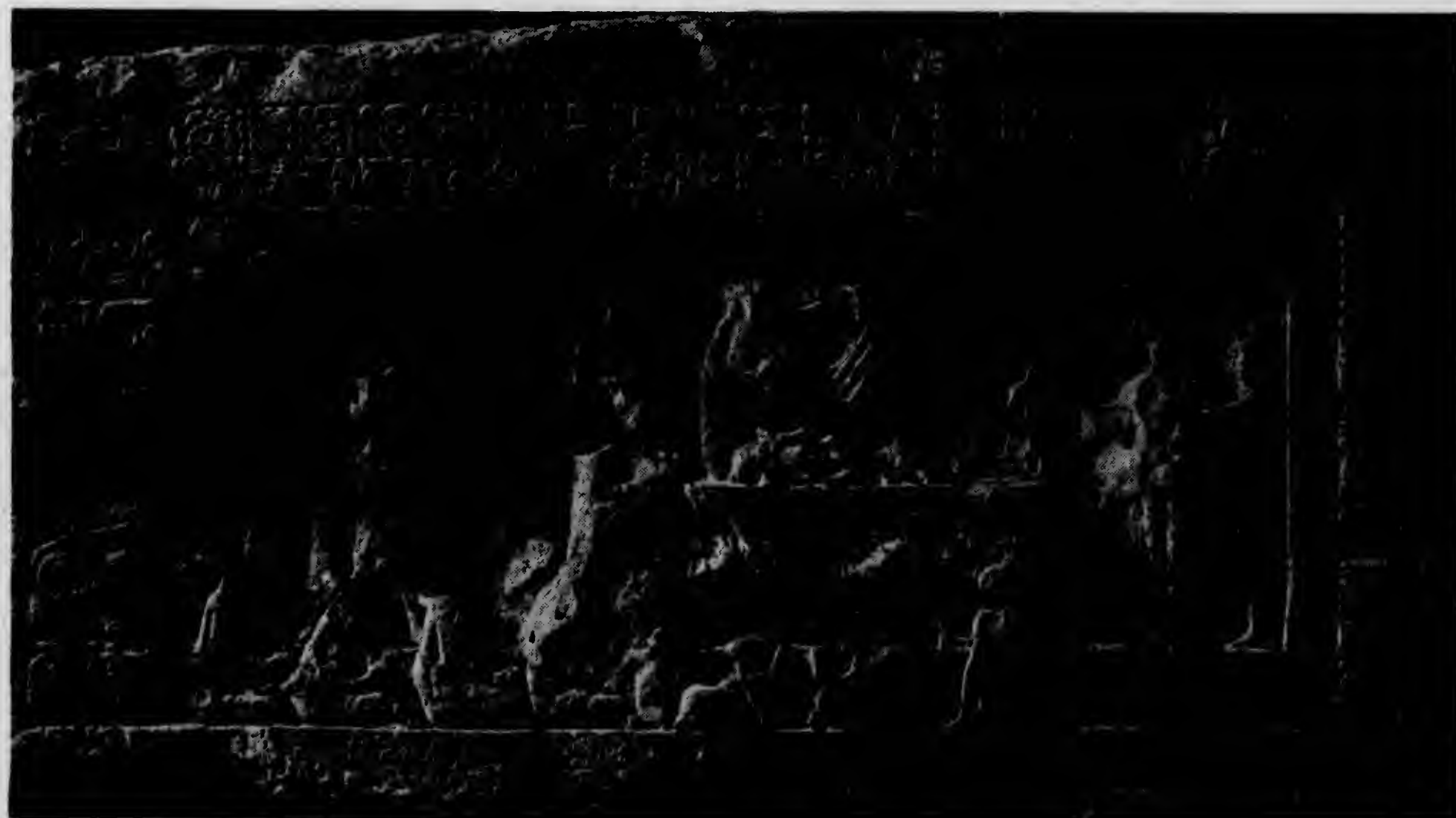
Piedras Negras means "black stones." The ruins known by this name have been known to contain some of the most beautiful carvings wrought by Mayan Indians. The city was one of the older Mayan settlements, which flourished for a number of centuries from about 350 A. D.

The ruins lie on the Usumacinta River in the northwest corner of Guatemala,

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"This statistical fallacy will no doubt perturb many well-meaning persons who have gloried in our falling mortality rates," he added.

Mr. Britten explained his prediction by reference to figures on sickness and death in this country since its first settlement. The reduction in mortality, he pointed out, has come entirely at the



CARVED STONE LINTEL

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Retake of Preceding Frame



GREAT ALTAR

Visitors to the exhibit of the Carnegie Institution are viewing one of the finest sculptures ever found in the Mayan area, an altar from Quirigua. This was an important ceremonial center of what is now Guatemala at about the time Rome was succumbing to the Goths.

Sci. News Letter, Jan. 26, 1935.



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S. H. N. v. 100, 1915

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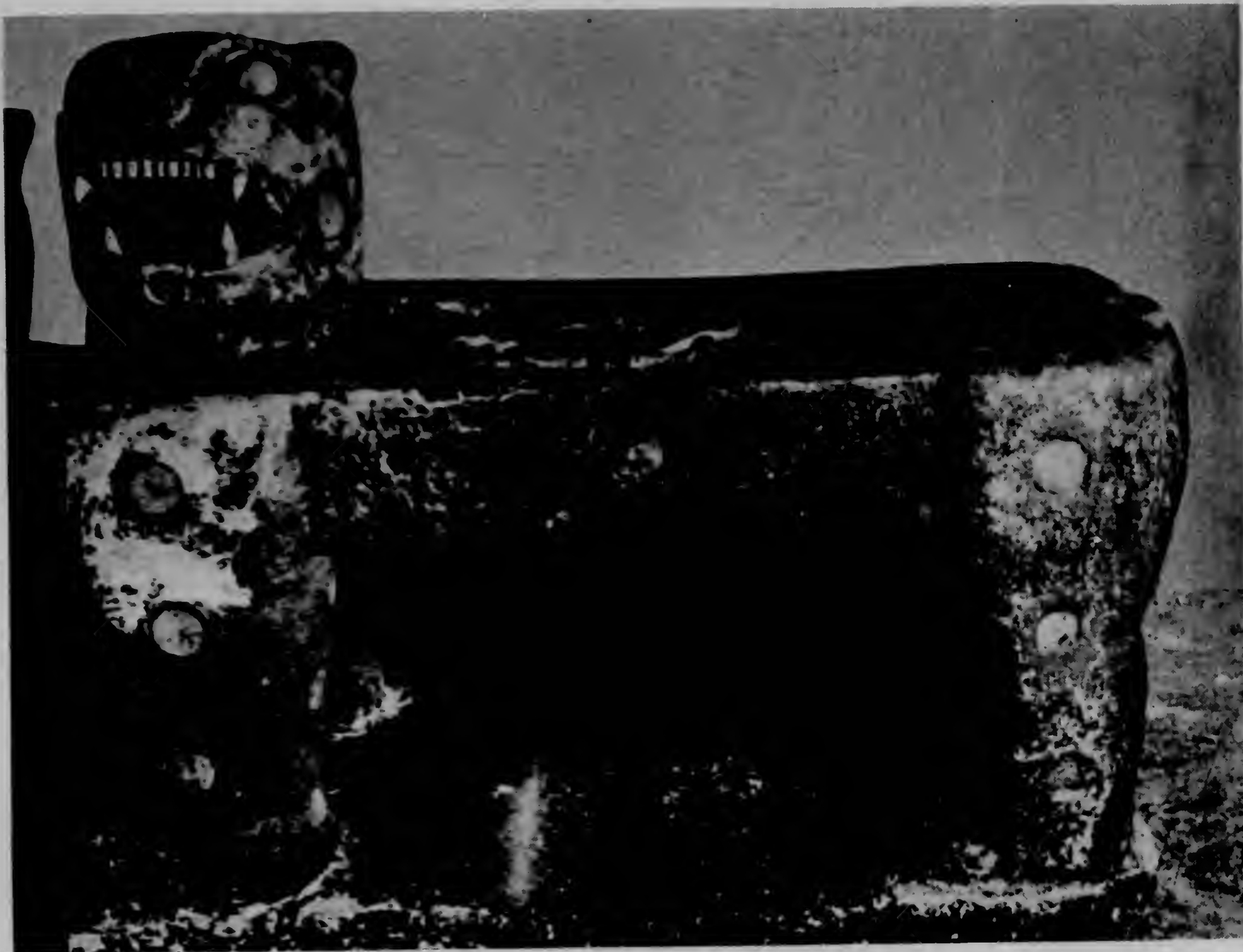
Jaguar Altar in Red Latest Mexican Find

A BIG stone jaguar painted brightest red, with eyes of fine apple-green jade, and with large body-spots of jade as well, has been discovered in a ruined Mayan temple in Chichen Itza, ancient Indian capital of Yucatan.

On the flat of the creature's back, which was evidently used as an altar-table, lay a tell-tale souvenir left by the hand of the last priest officiating forgotten centuries ago. This was a big round turquoise mosaic plate on which had been put a precious jade-and-shell necklace with a jade figurine. As an offering to the gods, the whole was burned with copal gum, the tropic Indian incense of Mexico.

But archaeologists who came centuries late found the damage was not great. The mosaic design was left in place, and this has now been repaired with shellac. The whole relic has been encased in glass by Mexican government archaeologists, so that visitors may always see just how the ancient offering had been left.

The sanctuary of the jeweled jaguar is the back room of a temple that once stood on a flat-topped pyramid. The front room, dug out just last year, has a huge reclining human form carved from stone, brightly (Turn to page 301)



WHERE MAYAS WORSHIPPED

Centuries ago original Americans, the Mayas, worshipped at this strange altar just discovered. Note the precious turquoise plate on the red jaguar's back. Eyes and spots are represented by inlaid apple-green jade.

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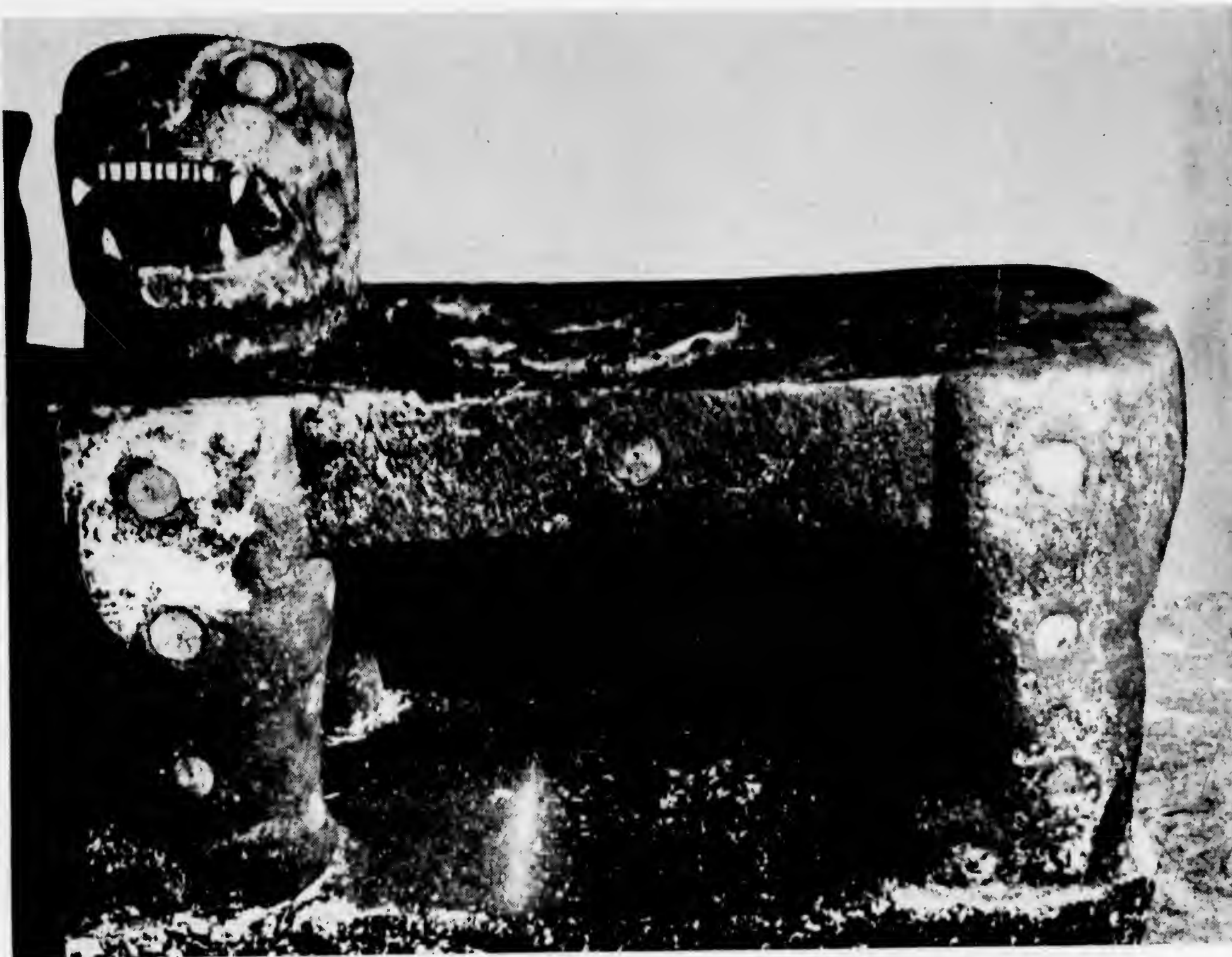
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Unfortunately there is no technology in this volume, but no doubt Father Bösch has the information which would be of great value to those concerned with that subject in ethnological museums.

WILFRID D. HAMBLY

AMERICA

Ethnology of the Mayas of Southern and Central British Honduras. J. ERIC THOMPSON. (Field Museum of Natural History, Publ. 274, Anthropological Series. 17: 2-196 pp., 24 pls., 1 map, 1930.)

This is conscientious study of the ethnology of several relatively pure Maya villages in southern and central British Honduras made in connection with expeditions for the British Museum and the Field Museum. The Maya are mostly of Kekchi or Chol stock from the Alta Vera Paz region of Guatemala with a fair number of immigrants from Peten and Yucatan. It is compactly written and has a great deal of ethnological information for the bulk of the publication, especially as some sixty pages are folklore. There are several suggestions that a greater time spent among the people with more numerous informants might have revealed more data, particularly on the non-material aspects of culture.

The Maya in the region covered by the volume still follow the milpa system of agriculture undoubtedly inherited from pre-conquest days. New land is usually cleared each year, the same piece not being used again for at least four years. Practically all the original native plants are still cultivated with an addition of European plants, few of which have become of great economic importance. Life is still wholly bound up with agriculture and in spite of the nominal Christianization of the Indians, belief and ceremonial are almost completely aboriginal in flavor, being concerned primarily with agriculture and secondarily with hunting and fishing. Many of the aboriginal deities are still far more important than the Christian God and the Saints.

Excellent detailed accounts are given of a number of technological processes. It would be interesting to have more of these. The method of preparing tortillas, for example, is given in detail and is rather different from that employed generally in Sinaloa and Sonora in Northern Mexico. The Maya place the metate on a stool about waist high, while the women of the west coast frequently kneel to it. This tortilla is pressed into shape on a banana leaf by the Maya, while on the west coast it is beaten out between the hands. The Maya grease the comal lightly, which I have never observed on the west coast, and they cook the tortilla slowly, whereas on the west coast tortillas to be eaten immediately are generally cooked very rapidly.

Among the many interesting survivals noted are the worship of the mams, the most active of the native deities who must be propitiated in all undertakings, the importance of the sun, moon, and morning star, the prominence of sorcerers, the use of the altar, censer and copal incense, ceremonial drinking, use of the pellet blow gun, poisoning fish and shooting them with the bow and arrow, the musical

march 1931

bow with and without the gourd resonator, the bullroarer as a children's toy, and masked dances, particularly the deer dance, which was widely spread throughout ancient Mexico and Northern Mexico and appears to have survived in an almost pure aboriginal form. Mr. Thompson also gives some evidence, both historical and technological, to show that the hammock is pre-Columbian among the Maya and not brought in from the West Indies by the Spanish as is generally believed.

The section on the cultivated plants of the Maya of San Antonio has good short discussions of an historical nature. Mr. Thompson is of the opinion that there may have been a cultivated variety of the plantain in America before the conquest. This is so contrary to the prevalent opinion that he should have given some real evidence. It is suggestive, however, that according to some early seventeenth century Relaciones published in the Documentos Ineditos, cited by Mr. Thompson, one of the principal *wild* foods for the Huastecs in the vicinity of Panuco (Tampico) was the platano. It is difficult to imagine an introduced plant becoming an important source of wild food within less than a century.

The collection of folklore is very interesting in showing the interweaving of European and native concepts, particularly with regard to religion. Several versions of a magic flight myth are given which deserve analysis by an expert to determine whether they are aboriginal or not. The same is true of several other stories. The Central American field evidently offers a large group of fascinating problems for the folklore student.

One statement on page 81 should be corrected. In a list of kinship terms which Mr. Thompson implies are native the word tata is given as meaning maternal uncle or paternal uncle. Tata is vulgar Spanish for father and in Northern Mexico at least is applied by persons of the peon class to any man distinctly older than the speaker.

The volume is liberally sprinkled with references to older literature but the comparative work suffers from the lack of similar studies. One of the chief virtues of the paper is perhaps that it emphasizes once more the fact that in spite of three to four hundred years of contact with white civilization the Mexican and Central American Indian still retains elements of his old culture. A comprehensive program of ethnographical work supplemented by an examination of the documentary sources and a check knowledge of Spanish culture of the sixteenth and seventeenth centuries should make it possible eventually to reconstruct a fair picture of the Indian cultures in Spanish North America. Mr. Thompson and the Field Museum are to be congratulated on making a valuable contribution to this difficult problem.

RALPH L. BEALS

~~*Derien in the Past.* S. LINNÉ. (Göteborgs Kungl. Vetenskaps och Vitterhets-Samhälles Handlingar, 5 Följden, ser. A, v. 1, no. 3, 1929. 318 pp., 62 figs., I+16 maps.)~~

~~Linné here maintains the excellent standard set in his South American Ceramics. He describes the result of archaeological exploration in Panama and the nearer parts of Colombia in 1927 by an expedition led by Nordenskiöld. Both the Atlantic~~

CARNEGIE INSTITUTION OF WASHINGTON

INVITES YOU TO ATTEND AN ILLUSTRATED LECTURE

ON

**THE MAYA AND MODERN CIVILIZATION:
A STUDY OF CULTURE CHANGE**

BY

ROBERT REDFIELD

ASSOCIATE PROFESSOR OF ANTHROPOLOGY, THE UNIVERSITY OF CHICAGO
RESEARCH ASSOCIATE, CARNEGIE INSTITUTION OF WASHINGTON

ON TUESDAY EVENING, NOVEMBER 10, 1931, AT 8.30 O'CLOCK
IN THE ASSEMBLY ROOM OF THE ADMINISTRATION BUILDING
OF THE INSTITUTION, SIXTEENTH AND P STREETS, NORTHWEST

The lecture is open to the public but tickets of admission will be required

INTEREST IN THE HISTORY OF THE MAYA OF THE DAYS BEFORE THE CONQUEST HAS LED TO AN INTEREST IN THEIR HISTORY SINCE THAT TIME. THE WORK OF CARNEGIE INSTITUTION IN YUCATAN NOW INCLUDES A STUDY OF THE CONTEMPORARY PEOPLES AND OF THE SOCIAL CHANGES GOING ON IN THAT PENINSULA. THE INHABITANTS REPRESENT THE RANGE OF SOCIAL DEVELOPMENT FROM THE PRIMITIVE TRIBE TO THE MODERN CITY. STUDIES HAVE BEEN BEGUN OF SAMPLE COMMUNITIES ALONG THIS RANGE OF CIVILIZATION. CHAN KOM, ALREADY STUDIED, IS A MAYA VILLAGE ON THE MARGINS OF CIVILIZATION, LOOKING BACKWARD TO ANCIENT RAINGODS AND THE PRESTIGE OF THE SHAMAN, AND FORWARD TO NEWSPAPERS, MOVING PICTURES, AND SCIENTIFIC AGRICULTURE. RELIGION AND MAGIC HISTORICALLY DERIVED FROM THE MAYA OF ANCIENT DAYS TEND TO DISAPPEAR UNDER THE INFLUENCE OF SCHOOLS AND ROADS. OBSERVATIONS OF THE FLOW OF LIFE IN THIS CHANGING COMMUNITY PROMISE TO DEVELOP TECHNIQUES FOR THE STUDY OF CULTURAL PROCESSES.

Upon application tickets may be obtained from the office of Carnegie Institution of Washington to the extent of the limited seating capacity of the assembly room

HALLEY'S COMET

THAT Halley's comet had two distinct tails which appeared as one when viewed from the earth is the recent conclusion of a University of California astronomer. Although the famous comet is known to have visited the earth every 75 years for as long a time as records have existed, its peculiar characteristics had not been thoroughly studied until the present work.

The investigation has been made by Dr. N. T. Bobrovnikoff, national research fellow in physics, and will soon be reported in a Lick Observatory publication. It is based on more than 700 photographs of Halley's comet, made at Lick and other observatories in 1910, and has consumed three years of intensive study.

One of the comet's appendages was a straight, narrow streamer of deadly carbon monoxide gas, according to Dr. Bobrovnikoff, while the other of meteoric dust was more diffuse, not so bright and considerably more curved.

By tracing the motion of gaseous and dust condensations outward from the head of the comet along the tail, Dr. Bobrovnikoff has been able to determine the law of force motivating these formations. The condensations are ejected from the head of the comet by internal explosions similar to volcanic eruptions on the earth, or the flaming prominences on the surface of the sun.

As soon as they are free from the head of the comet, the knots of volcanic matter move outward along the tail driven by a mysterious unknown force which outweighs the opposing gravitational attraction of the sun.

What this force is no one can say definitely at present. It may be due to radiation pressure from the sunlight, or to the effect of the sun's electrostatic field, or to a combination of the two. Whatever its source, its activity can be determined by studying the hyperbolic motion of the jets on successive photographs.

Dr. Bobrovnikoff has found that the moving particles in the curved tail obey a repulsive force less than one half that of solar gravitation, while the forces in the carbon monoxide tail attain values up to several hundred times the sun's attraction.

The presence of dark, invisible formations at much lower temperature was also detected, from their effects on the neighboring jets and streamers.

From the behavior of the jets near the head of the comet, Dr. Bobrovnikoff found it necessary to introduce a new unknown factor in his calculations, the repulsive force of the comet's head. He obtained a value for the mass of the head amounting to one ten billionth the mass of the earth.

The predominance of violet light in the comet's luminosity he interpreted as due to fluorescence or excitation of the cyanogen and other molecules by sunlight.

ECLIPSE PREDICTIONS BY THE MAYAS

HIGHLY accurate predictions of eclipses of the sun and the moon were made by the Maya Indians of Central

America at least eight centuries before Christ, according to Dr. Herbert J. Spinden, curator of ethnology of the Brooklyn Museum. But after the Mayas predicted an eclipse, they did their best to stop it by magical means. When occasionally their predictions failed and the eclipse did not occur, they attributed this to the success of their magic.

Dr. Spinden is now on his way to Europe where he will attend the meeting of the Twenty-fourth International Congress of Americanists at Hamburg, and will give a detailed report of his discoveries, which show a surprisingly extensive astronomical knowledge among these early Americans.

Before his departure he explained to *Science Service* that the Mayas, after observing and counting the days between eclipses occurring over a period of a century or more, discovered how eclipses repeat after a certain period. In 752 B. C., on November 10, according to our present calendar, there was an eclipse visible from their capital city. These studies gave them the knowledge to predict, and they worked out a period of 260 days, each with a separate name, which in multiples made a table by which eclipses could be foretold. But eclipses, especially of the sun, were supposed to be forebodings of evil and so they tried to stop them when they found that they were due.

The Mayas were at the height of their temple-building civilization during the first six centuries of our era and in their inscriptions on these temples they frequently noted eclipse days. Their hieroglyphic symbols were very expressive, for a sun eclipse was represented by their sign for the sun combined with the sign representing darkness, so that the symbol literally means "sun-darkness." Moon eclipses were represented by the moon face with a band as if it had a toothache and wore a bandage. Dr. Spinden thinks that the idea intended was that the days of the moon were finished and that it was tied up ready for burial.

DUST EXPLOSIONS

ALMOST all kinds of dust, even powdered metals, like aluminum or iron, are explosive when floating in the air, so the explosion that wrecked a grain elevator in Baltimore recently was not a very unusual occurrence. It was due to grain dust, floating in the air, and might have been started by an electric spark, though the cause can not definitely be stated at present and perhaps never will be ascertained.

The chemical engineering division of the U. S. Department of Agriculture is investigating the explosion, under the direction of David J. Price, in charge of the division, assisted by H. R. Brown and B. J. Culp.

Speaking to *Science Service* before the investigation, Mr. Price expressed surprise that the explosion occurred in the Western Maryland elevator, however. He said that it was a modern plant, of reinforced concrete con-

Connecticut Yankee Steps Into Ancient Literary World

Young Scholar Learns To Read Rare Mayan Works That Escaped the Flames of the Spanish Conquerors

A CONNECTICUT Yankee is stepping across the centuries, not into King Arthur's court but into the literary world of the Mayan civilization.

He is having the thrill of reading slowly—but very surely, as he believes—words in Mayan books that were last read and understood by Mayan Indian scholars in their temple libraries in Yucatan, centuries ago.

For one thing, he has learned to tell the words from the pictures, and that is no simple thing in a kind of writing that has often been called picture writing. On the brightly colored pages of a Mayan book, it appears, you can find our own popular modern method of telling a story by pictures and captions.

At the annual meeting of the American Anthropological Association, this young man from Wethersfield, Conn., Benjamin Lee Whorf, surprised his fellow research workers by reading off sentences from two of the famous Mayan books. Various scholars have attempted to read these books. Mr. Whorf's interpretation of the ancient text is entirely different from anything that any one had heretofore found on the Mayan pages. To account for his

reading, he carefully analyzed his method of deciphering no less than 41 Mayan words.

Study of ancient languages began as a hobby with Mr. Whorf, and he has gradually become more and more engrossed in America's own prize puzzle,



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From Page 119

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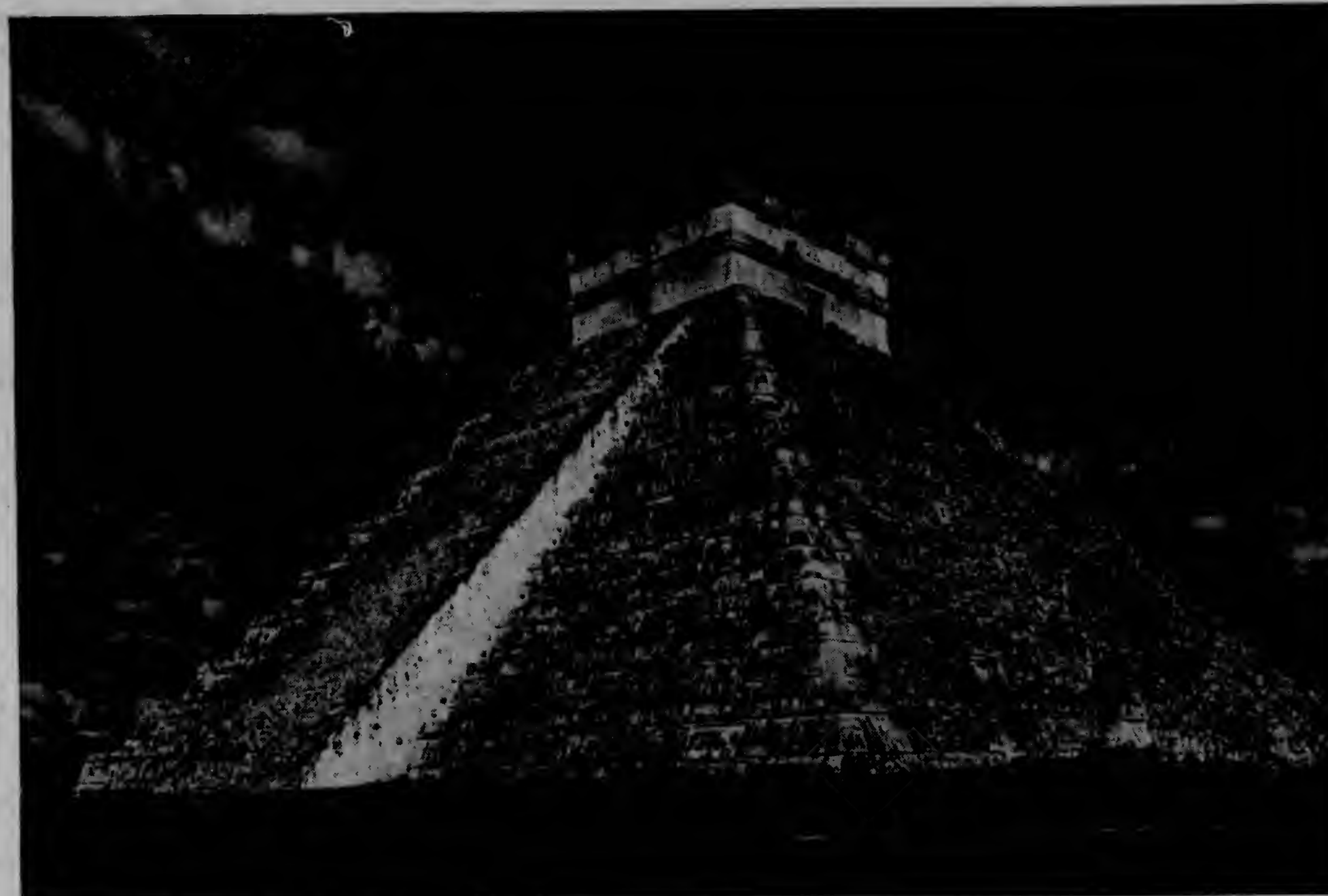
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Pictures beneath each line show the events told of, he explained, but the translation does not depend on the pictures, or appearance of the characters, but solely on the way the characters are put together, which is to spell the words of these Mayan sentences.

Beyond illustrative examples, this man who is ambitious to read the Mayan "classics" is not yet ready to read the Mayan books publicly.

"There is much work to be done," he says, "before the language can be regarded as fully understood. Hundreds of signs remain to be deciphered. And I feel the time has not come to tell more about the contents of the books as they are unfolding themselves."

Science News Letter, February 20, 1937



HOME OF LEARNING

In lofty temples like this, in the Mayan cities of Yucatan, America's earliest scholars wrote and read learned books. Out of the thousands of books these Indians treasured, only three have survived to offer twentieth century America a glimpse into an ancient literary world. This is an official copyrighted photograph of the National Geographic Society.

the writing system of the Mayan Indian civilization.

Backing enthusiasm with technical training, Mr. Whorf has plugged at university courses to learn how the Babylonians, and other ancient people, constructed their writing systems, and he is now working as an honorary fellow at Yale. One of his reports on the Mayan writings was published by Harvard University.

Only Three Books

The main goal is to read three Mayan books. There are no more. There are inscriptions in addition to date recordings on some of the stone monuments of the Mayas that archaeologists unearth in ruined cities in the American tropics. But the greatest interest attaches to the three Mayan books that escaped the flames when Spanish missionary zeal demanded that Mayan Indians make bonfires of all heathen works.

In one city alone, four thousand books of the Mayan literature were lost in these fires. When the crusade was over, the amazing erudition of a self-made American civilization was almost lost to history. In astronomy, calendar making, literature, these Indians could hold their own with any of the world's famous civilizations.

Three books, so far as any one knows, are the only exhibits from those libraries that escaped, and the three found their way to Paris, Dresden, and Madrid. The fate of Madrid's Mayan book, endangered by Spanish War, has not been learned. The book was separated in two parts, and treasured by two libraries in Madrid. It may have been removed from the city with numerous art works that have been saved. Facsimiles of the three Mayan books safeguard the contents for science, even though accident may befall the valuable originals.

It is not correct, says Mr. Whorf, to think of the Mayan Indians as drawing pictures for their writing system. They built their writing system on a much harder and more advanced principle. It was phonetic, with each sign standing for a sound or syllable.

Early Theory

Thus Mr. Whorf revives a very early theory about the Mayan writing. Yucatan's most famous colonial priest, the Spanish Bishop Landa, wrote down 27 characters of Mayan writing and explained that they represented sounds similar to those in the Roman alphabet. But when American scholars 50 years ago launched an intensive attack to explain the Mayan writing, they could not find that the bishop's Mayan al-

phabet was of any help. Their efforts failed. And so the phonetic theory of Mayan writing came to be mainly discounted.

Phonetic Writing

"The Mayan writing is phonetic," explained Mr. Whorf. "But Landa was wrong in thinking that 27 signs made a Mayan alphabet. In fact, there was no Mayan alphabet at all."

"The Mayas used several hundred signs in their writing. It was rather like the cuneiform writing of Babylonia in that respect."

"So far, I have deciphered enough signs to spell out about 100 written words in Mayan texts. Using these words I have read certain passages in the Mayan codices, as the books are called."

One significant fact about Mayan writing, which his studies bring out, is that the Mayas often had several ways of writing the same word. Just as today we write "through" or "thru" and recognize both as the same word, or just as we might conceivably write "coffee" or "kawphy" and read them both the same, so the Mayas often varied their spelling.

Word Spelt Two Ways

On a piece of paper Mr. Whorf quickly sketched two ways that a Mayan Indian could write the word "sit." It can be spelled, he explained, with different combinations of signs, and the result, to uninitiated eyes, gives very different appearances.

Complete deciphering of Mayan writing, Mr. Whorf maintains, means not merely recognizing what a sign means, but knowing how it sounded when a Mayan Indian read it aloud. In time, he believes, it will be possible to read the ancient books aloud. Living Mayan Indians, who have lost the literary and scientific heritage of their ancestors, still retain most of the speech forms, and can be of considerable help in fitting Mayan sounds to signs.

Some pages in the Mayan books are inscribed with chants or verses, and illustrated by series of pictures, Mr. Whorf says. The Indians repeated the chants in stanzas, like songs chanted by some Indian tribes in the United States today.

Mayan Song Described

From the Spanish-owned Mayan book, the Codex Tro-cortesianus, Mr. Whorf read this line: "God I our lord implants staff in ground." God I is just an alphabet (Turn to page 125)

ARCHAEOLOGY

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Retake of Preceding Frame

ARCHAEOLOGY

Explorer of Calakmul Finds Second Ruined Maya City

A SECOND ruined Maya city, much smaller than Calakmul, has been reported by C. L. Lundell, Dallas, Texas, botanist, upon his return from Yucatan bringing details of his finds.

The second ruined city reported by Mr. Lundell is called Nohoxna and it is located fifteen miles from the Guatemalan border in the Mexican state of Petan about half way between Calakmul, the other city he reported, and Uaxactun, a ruin where Carnegie Institution archaeologists have been working. It contains nine monuments.

Mr. Lundell stopped off in New Orleans on his way home, and conferred with Dr. Frans Blom of Tulane University. The finding of Calakmul was declared by Dr. Blom to be of the greatest importance. He predicted that the reading of hieroglyphs found on the monuments may fill gaps in present knowledge.

The finding of Calakmul was announced on April 30 by the Carnegie Institution of Washington which sent a party to confirm Mr. Lundell's report. Dr. Sylvanus G. Morley, who visited the ruins, pronounced them the largest of Maya cities and important in understanding the early history of the Maya Indians.

Reports from Mexico City credit the discovery of Calakmul to a Mexican chicle gatherer, Francisco Morales.

Visits Unconquered Maya Tribe

One member of the Tulane University Expedition, which left last January, 1928, to explore unknown parts of the Maya area in southern Mexico and Guatemala, has returned to civilization, while the others are still somewhere in the brush.

Carlos Basauri, ethnologist of the expedition and representative of the Mexican Department of Education, has just returned to Mexico City via Yucatan, but without Frans Blom, leader of the expedition, and the other members, with whom he parted company in the Peten region of Guatemala over a month ago. Mr. Blom, looking for archæological ruins, decided to make his way straight north through the almost unpopulated areas, while Señor Basauri, interested in people, was to make his way to the inhabited parts. The two had designated three meeting places in Quintana Roo and Yucatan, but each time

Archæology

Mr. Blom failed to be on the spot.

Senor Basauri made ethnological studies upon various of the Maya races which the party encountered, and succeeded in getting to Santa Cruz, Quintana Roo, the capital of the famous unconquered Maya tribes who have successfully defied the white man from the time of the Conquest four centuries ago to the present day. They are the living remainder of the Maya Empire and made their last effort to drive the whites out of Yucatan only about 80 years ago, during the cruel "War of the Castes," in which they nearly succeeded. But eventually defeated, they withdrew to their jungles where they remain today resisting the white man and his civilization to the last.

The governments of Mexico, since 1910, have made friendly overtures to these Indians with the hope of "incorporating" them in the republic, for

there are many people who see in races with such determination one of the hopes of future Mexico. The Indians are now only nominally under the Mexican government, having their own chief, Mai, called "General" Mai, by the courteous Federal Government, to make it look better. All of Señor Basauri's experiences in the land of the unconquered Indians were not pleasant, but he succeeded in getting certain anthropological measurements, which is the first time these have been made.

Señor Basauri also brought with him the scraps of prehistoric Maya fabric which the expedition found early in the season in a cave in southern Chiapas, within the area of the old Maya Empire. Only one other prehistoric example of Maya textile exists, as far as is now known, and that is in the Peabody Museum of Harvard University.

Science News-Letter, August 25, 1928

ORIGIN OF THE MAYA CALENDAR

THE simple method by which ancient wise men of tropical America observed the sun and were able to tell their people when to plant crops has been discovered by Mrs. Zelia Nuttall, a well-known authority on Mexican archeology. Mrs. Nuttall, who has spent over thirty years studying the antiquities and early history of ancient Mexico, is now in this city, where she explained her theory to the American Anthropological Association. On their arrival in the New World the Spaniards were surprised to find that the natives had an accurate knowledge of the length of the solar year. This remarkable fact has hitherto been explained as an indication that early astronomer priests, even in primitive communities, must have made careful observations of the sun and must have gradually worked out a system of calculating and recording the average number of days between the longest and shortest days in the year. Mrs. Nuttall found that such difficult, complicated and sustained mental efforts were not necessary nor probable.

"All the centers of ancient American culture," she explains, "are situated within the tropics. In this zone the sun passes twice a year through the zenith, the result being that twice a year at noon there occurred the momentary striking phenomenon of all vertical objects casting no shadow.

"Archeological and documentary evidence establish beyond doubt that the Mexican, Maya, Peruvians, Ecuadorians and others inhabiting the tropical zone observed the periodical strange and momentary disappearance of shadows and interpreted it as 'a descent of the Sun-God.'

"This 'descent of the god' was of outstanding importance to the primitive farmers, because it was always accompanied by rains, caused by the heat of the vertical solar rays. The priests or wise men who observed the 'descent of the god' could thus safely assure the people that the time was ready for them to sow the seeds of maize and other food plants."

The first means by which the solar phenomenon could have been noted were plain vertical posts or upright stones. But later, Mrs. Nuttall believes, the people began to feel that more worthy places of rest should be provided for the descending Sun-God. Sun-pillars, stelae, stone seats, altars, towers, and even shrines and temples were set up to celebrate this great and mysterious phenomenon, and in time an elaborate ceremonial was developed, which included the offering of blood and sacrifice of human victims.

In the light of this discovery, ancient American religions, art and calendars take on new aspects. The Sun-God, who is so widely depicted in the Mexican Codices and bas-reliefs and on Maya temples with his heels in the air and his head far below them, has generally been termed "the diving god." According to Mrs. Nuttall's interpretation of these figures, the god is descending through the air and the feather-like decorations on his arms are symbolical like the wings with which angels are represented in Christian art. Many of the carved and painted representations of the Sun-God in the form of a human being, bird or jaguar, show him accompanied by plumed serpents which symbolize the rains from heaven associated with him.

Chichen Itza

TURQUOISES and other rare and beautiful objects which were buried beneath an altar in Chichen Itza some 700 years ago have been discovered by Earl Morris, archeologist of the Carnegie Institution of Washington. A telegraphic report from Mr. Morris states that the space

beneath the altar has not been fully explored, but articles which have been removed from their hiding place prove it to be the most important cache of Maya objects known in Yucatan. A magnificent mosaic disk, containing one thousand beautifully cut and polished turquoises, is pronounced the most elaborate and beautiful product of the Maya civilization that has ever been discovered. The altar find was made in the Temple of the Warriors, which is one of the masterpieces of Maya architecture. Each column in the temple is graven with the figure of a warrior in full regalia, and it is believed that the eighty or more warriors are all portraits of real Maya heroes. The temple, however, was built in honor of the Plumed Serpent, an important Maya deity.

Science - March 16, 1928.



INTERNATIONAL

Look at the perfection of the masonry in this massive building. The huge temple was constructed by the Mayas in Yucatan at a time when our ancestors in Europe still wore skins and drank mead out of the horns of the wood-buffalo. The Mayas were versed in the arts and sciences, having reached proficiency in astronomy equal to that of the Egyptians, long before St. Patrick drove the snakes out of Ireland. Now the extensive ruins in Yucatan are to be explored by the Carnegie Institute and most interesting revelations concerning the history of culture in America are expected



INTERNATIONAL

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Retake of Preceding Frame

Nine Pairs of Stucco Feet Discovered in Mayan Ruins

NINE PAIRS of little feet and legs in a neat row, all that is left of nine seated figures in a stucco bas relief—this intriguing piece of ancient art has been discovered at Yaxchilan, Mexico, by archaeologists of the Carnegie Institution of Washington. Results of the Institution's latest archaeological expeditions in the Mayan country have been announced. The excavations at Yaxchilan were under the direction of Dr. Sylvanus G. Morley.

Did the nine pairs of stucco feet belong to the nine most mysterious gods of the ancient Mayas? This thought sprung into the minds of the archaeologists who found the broken piece. Old writings about the Mayan Indians emphasize a special group of nine gods, but tell little about them. Even their names are unknown. According to one interpretation these nine were the gods of the Mayan underworld.

The broken slab will never show the faces or reveal the identities of the dignitaries who once sat so stiffly in a row, for the upper portion of the slab is hopelessly destroyed. When perfect, the piece was not more than a foot and a half high, even if the seated figures wore the most towering of Mayan feathered headdresses.

Yaxchilan, where the stucco figures were found, was one of the Mayan cities in the Usumacintla Valley of Mex-

ico. In this valley a number of outstanding cities of the Old Mayan Empire stood in early centuries of the Christian era. Palenque was one of these and Piedras Negras another.

Yaxchilan was perhaps the most spectacular site of them all, perhaps the most spectacular in the Mayan area, declares Dr. Morley. The builders chose a superb natural setting of hills and river for the temples and official buildings. Along the bank of the curving Usumacintla River, a line of buildings, almost continuous, was erected.

Twelve Monuments

On the first bench level above the river was set a series of courts and plazas. And beyond and above these courts, where the hills rose, the Mayan builders constructed a second row of buildings paralleling the river row. The very summits of the hills were leveled that buildings might stand on them crowning the scene.

Twelve important hieroglyphic monuments which show the age of the site were found by the Carnegie expedition. One of these monuments is the oldest known date stone set up by the Mayas in the Usumacintla Valley. It appears that this valley was a place of settlement as early as the third century A. D.

Science News Letter, January 23, 1932

Scientists Watch Changes In Living Maya Civilization

BY STUDYING living Mayas in the peninsula of Yucatan, science is beginning to catch glimpses of how civilization comes to groups of human beings. What has been learned so far, from observations in a Mayan Indian village, was reported by Dr. Robert Redfield, anthropologist of the University of Chicago, in a lecture at the Carnegie Institution of Washington.

Yucatan offers a laboratory where civilization can be observed in the making, Dr. Redfield explained. Not only do the Mayan inhabitants represent the entire range of social development from primitive tribe to modern city, but these groups in so many different stages of advancement are all being influenced by civilizing factors today, and it is possible to note how changes come.

The first village which has been studied is Chan Kom, near the ruins of the ancient Mayan city of Chichen Itza. The 250 people of Chan Kom are all Mayan Indians, representing a middle stage of progress. Chan Kom mixes old and new, often incongruously.

Native medicine men tell the people that sickness is brought by evil spirits or by angry gods, and the people have enough confidence in these explanations to consult the medicine man. But a sick person may also send to the town drug store for medicine.

Science News Letter, December 5, 1931

THE INFLUENCE OF DISEASE ON MAYA HISTORY

WHETHER disease or war or famine primarily caused the downfall of the great Maya empire has never been satisfactorily determined. Now an expedition of doctors and public health experts is setting out for Chichen Itza, capital city of this old American civilization, to find out, if possible, whether it was disease that ruined it and if so, what diseases in particular.

The expedition is from the department of tropical medicine of the Harvard Medical School and School of Public Health and the Carnegie Institution of Washington. It is in charge of Dr. George C. Shattuck and includes Dr. Joseph C. Bequaert, entomologist; Dr. Jack H. Sandground, parasitologist; Dr. Kenneth Goodner, bacteriologist, and Byron L. Bennett, laboratory technician.

Nothing is now left of beautiful Chichen Itza but ruins. However, in some of the neighboring villages the population consists of practically pureblooded Maya Indians. A study of the diseases that afflict these people now may throw light on the diseases that their ancestors suffered from. Such is the object and hope of the present expedition.

The case for disease as the destroyer of this famous old civilization, which collapsed about the time of the Spanish conquest, is particularly good when one considers what a hotbed of disease Middle America has been, so far as our knowledge of it goes. The various fevers carried by parasites and insects may or may not have existed before the white man came to America. Of course, if they did, the Indians probably had acquired an immunity to them, in which case the downfall of the Mayas probably resulted from wars with other tribes.

Yellow fever and syphilis are now generally accepted as being of strictly American origin. On the other hand, smallpox, measles, malaria, hookworm, Asiatic cholera and trachoma, all of which have been very deadly for the red man, were introduced by the white man.

Whatever the cause, it is generally conceded that the Mayas were already greatly weakened before the Spaniards arrived. This accounts for their rapid downfall, the Spanish conquest.

Science News - Feb. 15, 1929.

Mayan Engineers Lacked Imagination of Artists

LACK of imagination kept Mayan Indians in the American tropics from looking at their beautifully ornate stone buildings and seeing how the construction could be greatly improved.

For want of imagination, those Mayan engineers never discovered the principle of the true arch. They never learned the trick of bonding or overlapping their building stones to make a firmer structure.

This is the verdict of Lawrence Roys, noted engineer, who has just completed an appraisal of the engineering knowledge of America's most famous prehistoric builders. Mr. Roys made his study under the auspices of the Carnegie Institution of Washington.

Imagination of the Mayas was poured out on artistic creations. The sculptors never wearied of contriving elaborate patterns and resplendent figures of gods and men. Where stone was used in artistic expression, says Mr. Roys, it "came alive." And as the sculptors advanced in their esthetic portrayals, they also advanced technically. But the engineers and architects who laid the plans and raised the walls achieved no comparable progress in technique.

"It would seem," says Mr. Roys of the Mayas, "that their architects thought in terms of monolithic masses wherever possible, and took comparatively little interest in the manner in which individual stones were laid together."

The Mayas developed only moderate skill in fashioning the dry rubble masonry of roadways, platforms, and pyra-

mids. They do not seem to have tried using wood to supplant stone in their more permanent structures. Their wall building methods set up strains when the foundations settled, and resulted in long vertical cleavages. They apparently never racked their brains to avert such mishaps.

In handling lime cement or concrete, on the other hand, Mayan builders made better progress, and Mr. Roys is highly complimentary to the real skill they acquired in using this medium. As for their greatest engineering achievement, he considers this to be the vaulted roof. Somebody used imagination there.

Whether the latest studies of science find something to praise in the Mayas or something to disparage, these Indians of tropical America who raised the greatest prehistoric civilization on the continent remain always impressive. It is impressive now to consider that Indians with not very much imagination for engineering problems nevertheless built the most distinctive, and some critics have said the most beautiful, architecture to be seen anywhere in the Americas.

Science News Letter, June 9, 1934

~~Government plant breeders have succeeded in crossing sugarcane with a sweet sorghum, in their efforts to produce a plant that will mature earlier and thus tend to avoid hazards of early frost; but the sugar content of the cross is not yet determined.~~

ARCHAEOLOGY

Mayan History Revised By Mexican Archaeologist

Expedition to Inaccessible, Majestic Ruins of Palenque Convinces Authority There Was Only One Empire

By **SR. LUIS ROSADO VEGA,**

Director of the Archaeological and Historical Museum of Yucatan and Director of the Expedition of Palenque.

A RESEARCH expedition has just been completed to the remote ruins of the Maya city of Palenque, in the heart of the jungle in the State of Chiapas, Mexico. The ruins represent the most interesting and beautiful group of the very ancient Maya-Quiché civilization, perhaps the most notable on the American continent.

The expedition was organized and directed by myself, accompanied by Miguel Angel Fernandez, archaeologist of the Department of Monuments in Mexico City; Alberto Escalona, civil engineer and author of notable works on Mexican native civilizations; and the painter, Carlos Camara, who is especially interested in Mayan art.

The expedition's main object was to establish the route followed by Mayan Indians in their pioneer and colonizing migrations, and to rectify certain mistaken theories.

Palenque's ruins, whose beauty has been compared to that of the Parthenon of Greece, rise majestically at the foot of the southern Sierra Madre, a range of mountains crossing from Guatemala into the Yucatan peninsula where they disappear. The ruins offer an imposing sight in the midst of that wild scenery.

Over Forty Temples

More than forty temples are in the group of ruins, and there is the famous so-called "Cross of Palenque," subject of an extensive bibliography by archaeologists of all the world. Many opinions about Palenque and the cross are based on references or data not altogether correct, as difficult traveling in the jungle makes it uncomfortable to reach Palenque and few have visited it. Among these few are professors of Tulane University and the Carnegie Institution of Washington.

Much has been said about the "Cross of Palenque," a beautiful structure

simulating a perfect cross, wonderfully carved. Some have asserted it to be a Christian cross. But after this expedition, I refuse to accept this possibility, considering it entirely superficial. It is more likely a representation of the four cardinal points, which would be logical considering that the Mayas were devoted to astronomy and were highly developed in that line.

From studies by the expedition, certain opinions heretofore considered as facts by modern archaeology are rectified. We found reason to deny the existence of a division splitting the great Maya civilization into an Old Empire and a New Empire, which supposes the archaeological groups to be, first the Old Empire in Central America, including Palenque, and later the New Empire in the Yucatan peninsula.

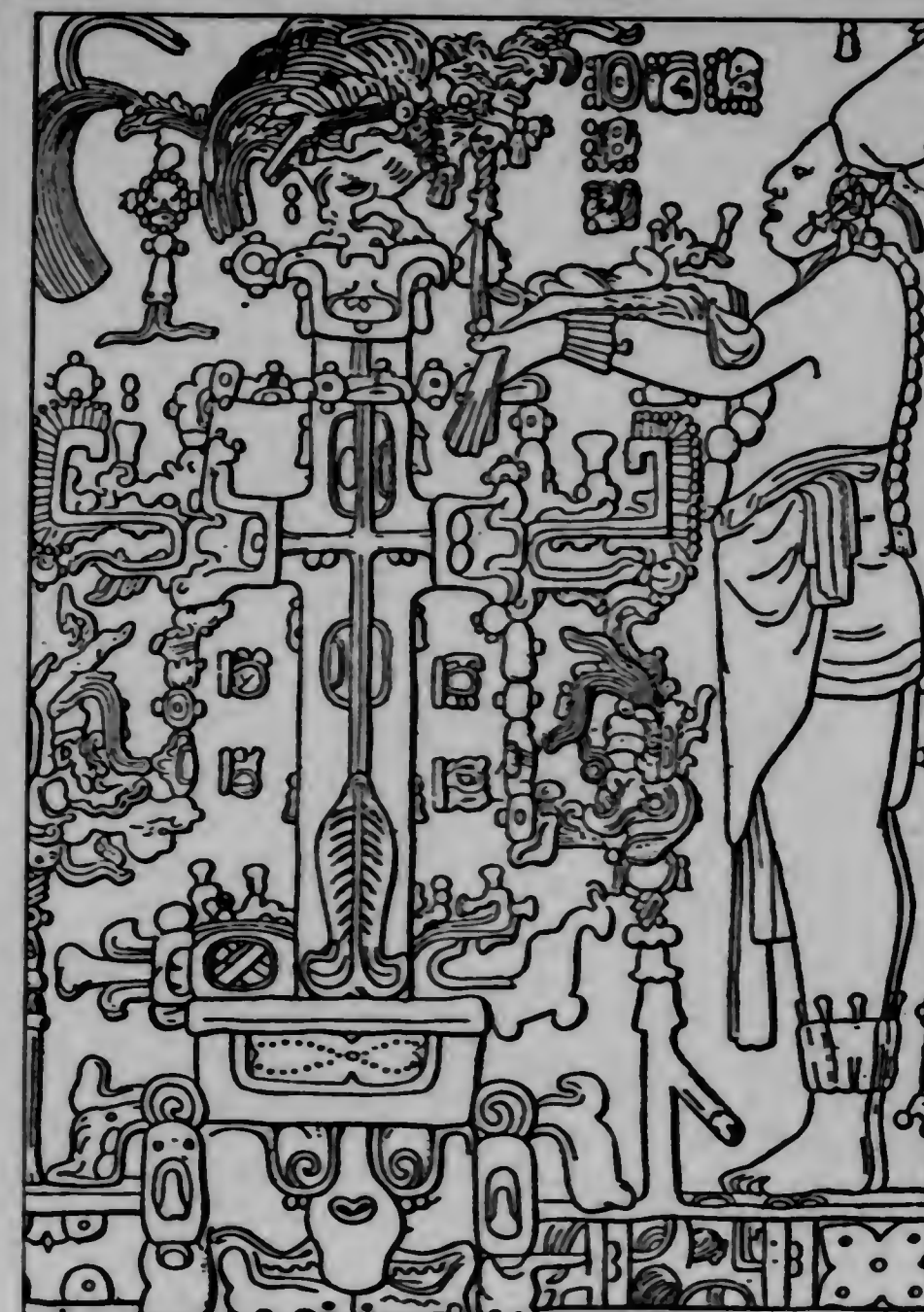
Not Older Than Yucatan

That Palenque by no means represents a period older than monuments found in Yucatan is sufficiently demonstrated by many points: the general characteristics pertaining to Mayan monuments such as pyramidal construction on terraces or truncated pyramids, the hieroglyphs entirely alike in all the groups, the shape of the ceilings, the seats placed according to astronomical calculations, and last, the perfect construction of the monuments in Palenque which is the cause of the beauty of fresco, sculpture, and carving.

What seems probable is that the Mayan tribes lived in the same period of art and civilization, not those of the north following those of the south. This does not deny that cities were built or lost at different times, but the artistic and structural rhythm is always the same.

There was only one civilization with slight differences manifested according to environment.

From Mexico City, we followed the logical route that would have been taken by the Mayan tribes from Central America to Yucatan. From a starting point called Nine Hills, the group of



CROSS OF PALENQUE

A line drawing representing a portion of the tablet of the Cross.

people who were the origin of the Mayan civilization are supposed to have left the Mexican regions and spread through Central America. They founded first the large city of Copan in Honduras and then Quirigua in Guatemala and Palenque in Chiapas and then spread to populate the banks of the great Usumacinta River until they reached Tabasco, and thence they proceeded to Campeche where they founded great communities whose ruins can be seen. Then they went on to Yucatan, leaving along their course monuments whose ruins still cause the admiration of the traveler.

This route is in perfect accord with my thesis, in the sense that there was no Old and New Empire but only different places where branches of the primitive group settled, and it is well to have in mind that not the group as a whole migrated, but colonies, so to speak, each went their own way.

Science News Letter, November 4, 1933

ing the latter eurymetopic at 75.6. The rather pronounced height of 139 mm. gives rise to an ortho-, almost hypsicranial condition.

Among the fragmentary longbone material were parts of femora and tibiae upon which platymeric and platycnemic conditions could be recognized.

The skull in question corresponds in type to one from Mycenae, also female, in the series referred to at the beginning of this review. The morphological evaluation of these specimens points towards a Nordic affinity and, in connection therewith, the nomadic habits of the ancient pastoral tribes of Thessaly and the Peloponnesos.

The carefully prepared monograph contains the photographic views of the Hagiorgitica skull in the five normae.

BRUNO OETTEKING

Maya-Spanish Crosses in Yucatan. GEORGE DEE WILLIAMS. (Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University, vol. XIII, no. 1, 256 pp., 47 pls. Cambridge, Massachusetts, 1931.)

The first attempts to solve the problems of race mixtures proved abortive. Embalmed in nineteenth century literature, they are now more objects of curiosity than of utility to the student of human crossing. During the first decade of the present century, the physical anthropologist either through inertia or as the better part of wisdom waited for the increasing perfection of the new genetic tools which were then being enthusiastically and excitingly forged. When, therefore, after a period of inactivity in race mixture investigations, *Die Rehobother Bastards* appeared in 1913, its author, Eugen Fischer, loomed forth as a pioneer in a sadly neglected field. This now classic book can not be said to have resolved the vexatious issues raised by human miscegenation; but it can claim to have clearly demonstrated that at last a methodology was at hand which offered some measure of assurance that progress could be achieved. Instead of being followed by a flood of imitative literature, this book remained alone; partly, I presume, as a consequence of the war. Even as recently as 1923 when I set out to visit the Norfolk Islanders, inspired by the opportunity envisioned in Fischer's monograph, there were still no other considerable studies on the genetic phenomena of group mixtures. Since then, however, there have been issued a short but highly significant series of such investigations. To this company Dr. Williams has made a notable contribution.

The population which has fallen to Dr. Williams to investigate has not offered him an opportunity to come to grips with the most significant aspects of race mixture. The Yucatecans, the subjects of his monograph, are a cross between Europeans mainly if not exclusively of Hispanic origin, and Maya Indians. The beginnings of this hybrid group are rooted in the sixteenth century, although its growth has undoubtedly been sustained in the succeeding period by continued mixtures. Under these circumstances, it is impossible to demand exact genealogical records, if perchance they meant anything refracted through a glass four hundred years thick. Equally obvious the conventional experimental set-up, consisting of pure parental groups, an F1 generation, an F2 generation, and the backcrosses, were necessarily

lacking. But if Dr. Williams could find no crosses in the making, he had a population which presented itself as a *fait accompli*, and he has attempted to analyze its characteristics and to determine what may be the fate of a miscegenation between two distinct stocks.

Using an empiric method sometimes employed by physical anthropologists, Dr. Williams divided his sample into five groups, selected on the basis of five non-adaptive traits. Of these classes, the first two, A and B, approached the Maya in their group characteristics while the last two, D and E were least like the Maya, and most like the Whites. The middle group, C, represented the residuum. The greater part of the monograph is concerned with an inter-group comparison trait by trait for a long and full list of anthropometric measurements and observations. The demonstration is convincing that these groups represent real subdivisions of the general Yucatan population, for in a large number of characters, uncorrelated with those which were used as a basis for the original five-fold division, there are significant differences between the various groups. These differences, moreover, frequently show a progressive increase or decrease from A to E. This linkage between traits which permit the original parental combinations to segregate themselves out would be extremely difficult to evaluate genetically in the absence of essential data, and Dr. Williams has wisely, though with reluctance I imagine, declined to attempt it.

The heterosis which may frequently characterize a mixed population and which I found among the Norfolk Island descendants of the Mutineers of the *Bounty* is absent here. Dr. Williams is inclined to regard this absence of heterosis as a result of long inbreeding. In a reduced variability, too, the Yucatecans give evidence that inbreeding has taken place.

In addition to an anthropometric schedule, Dr. Williams has completed the picture of his population by taking a series of blood-groupings, basal metabolisms, and vital records. An analysis of marriage records indicates that the crystallization of the five segregated groups is strengthened by preferential mating. In all these data, as well as in the physical measurements and observations, there are clear-cut differences between the various groups. The final conclusion, therefore, that true-breeding subtypes are discernible in the mixed Yucatecan population is amply borne out by the impressive mass of carefully presented material.

H. L. SHAPIRO

PRIMITIVE MUSIC

Folk Culture on St. Helena Island. GUY B. JOHNSON. (183 pages, musical illustrations. \$3.00. Chapel Hill, N.C.: The University of North Carolina Press, 1930.)

This study is both delightful reading and sound methodology. The author discusses, not the entire folk culture, a term which in this application is somewhat misleading, but the peculiar dialect, the folk songs (more especially the spirituals), and their melody, presenting in conclusion a collection of typical tales, riddles, and superstitions of the Gullah living on St. Helena. The work was undertaken at least partly with a view to ascertaining on what grounds generalizations might be made

ARCHAEOLOGY

Key to Mayan Writing Found In Long Forgotten Book

An Unknown Spaniard Wrote Booklet 300 Years Ago Giving Meaning of 40 Mayan Hieroglyphs

THE key to the hitherto undeciphered Mayan writing, America's greatest prehistoric mystery, was handed to science by Prof. William Gates of Johns Hopkins University.

The Rosetta stone of the Mayan hieroglyphs now revealed is a three hundred year old booklet by a forgotten Spaniard. In it are 40 Mayan signs translated into Spanish.

Now archaeologists expect to go to the famous unread Mayan stela or calendar monuments that dot Yucatan and other Central American areas, and begin more successfully to unravel their unread history. Dates and figure signs have been known in the past, but the writing has remained tantalizing uncertain.

Among the 40 Mayan hieroglyphs identified by the Spaniard are:

Light, life, hunger, treasure.

The booklet, just published by the Maya Society, is by a Spaniard named R. Gomesta who lived at the end of the sixteenth century in Yucatan. A statement in Gomesta's own handwriting in his book declared that he possessed ancient Indian hieroglyphic books and that native friends had interpreted them for him.

The booklet vindicates Bishop Landa, sixteenth century Spanish prelate in Yucatan, of the charge of perpetrating a hoax, that some have held against him.

The Bishop gained his greatest historic moment when he ordered all the Mayan books gathered and burned in a great bonfire. Only three of these literary treasures escaped the flames, for modern science to study.

The suspected "hoax," which Landa left to posterity, was an alphabet of letters supposed to be a key to Mayan writing. The alphabet letters of Bishop Landa's key looked like Mayan script, but they seemed to have no meaning, and could not make readable the mysterious carvings on the stone monuments of Yucatan nor the three surviving Mayan books.

That the Bishop was not faking his

knowledge of Mayan writing is suggested by the discovery that Gomesta uses a few "letters" identical with those of Landa's "alphabet" and explains how to write with these "letters" the name of the Plumed Serpent god, Kukulcan. This would indicate that the style of writing recorded by the Bishop was actually in vogue among Mayan Indians of Yucatan in the days of the Spanish Conquest in the sixteenth century. It is possible that the Landa system was a degeneration of the old classical writing on carved monuments of the old Mayan cities.

The Gomesta manuscript explains another point moot among archaeologists. A certain Mayan god, whom scientists have merely lettered as "God B," for want of positive knowledge of his identity, is explained to be the great Itzamná, god of life, and not Kukulcan, the Birdsnake.

The document directs important facets of light upon many other points, and contains some bits of strange and curious lore. There is, for instance, a recipe for making ointment from gum and tiger-grease to put on women sacrificial victims destined for the Sacred Well of Chichen Itza, in Yucatan. This unction was to keep their bodies from swelling afterwards in the sacred waters.

Science News Letter, February 16, 1935

BIOCHEMISTRY

Auxin, Promoting Growth Of Plants, is Synthesized

AUXIN, the inner secretion of plants that makes cells grow, has been produced synthetically at the California Institute of Technology (*Nature*, Jan. 19). The work was done by Drs. Kenneth V. Thimann and J. B. Koepfli, of the Institute faculty.

Drs. Thimann and Koepfli followed a "lead" provided by an earlier investigator, who had shown one of the active growth-promoting substances to be the same thing as the complex organic compound known as beta-indolyl acetic acid.



"ROSETTA STONE"

This page from a 300-year-old book by a forgotten Spaniard in Mexico promises to afford a key to the secrets of the ancient Mayan hieroglyphic writing.

They prepared this in the laboratory, and tested it on properly prepared young plants. The synthetic substance worked as well as the natural, causing both cell elongation and the growth of new roots.

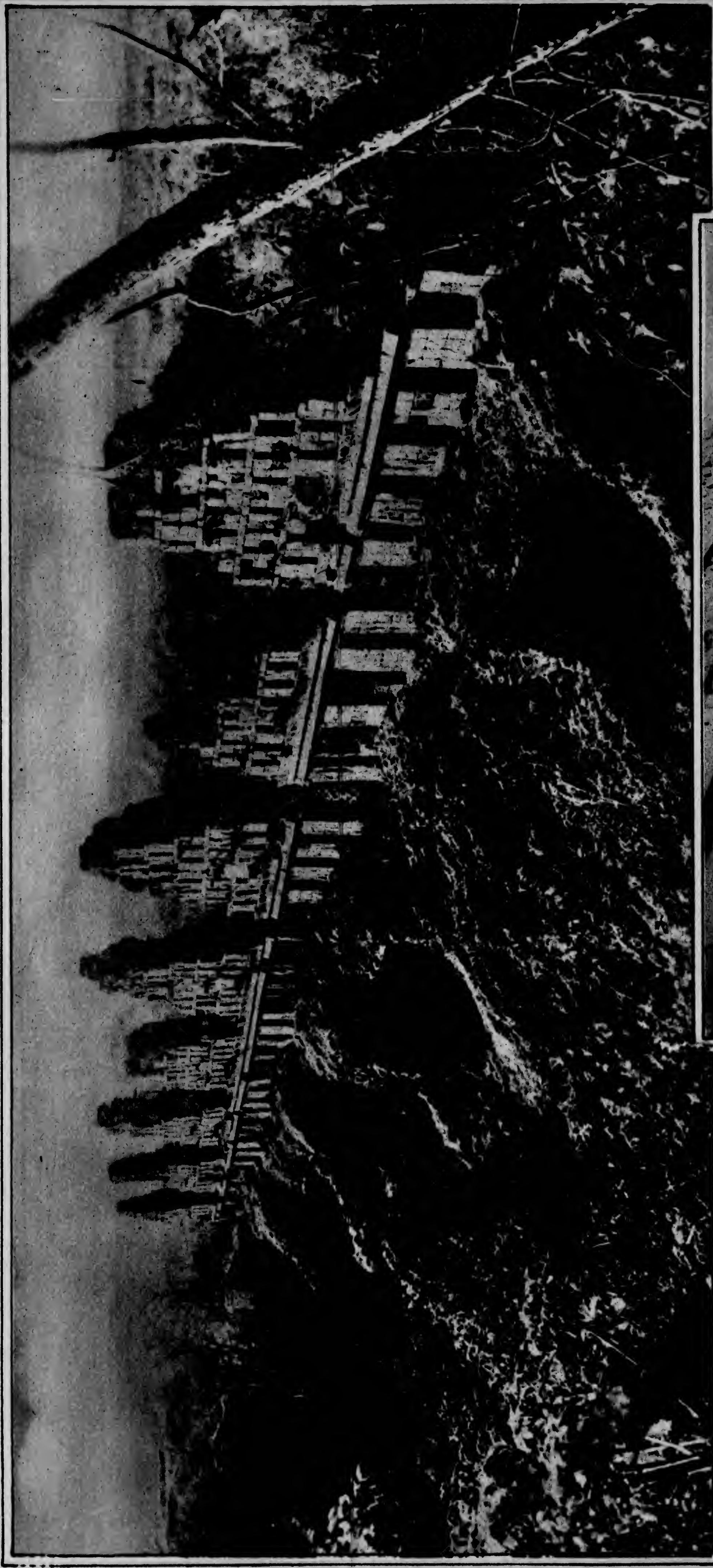
Further evidence of the versatility of auxin, in promoting another kind of growth, was reported to *Nature* by two Oxford University botanists, Dr. R. Snow and B. LeFanu. They found that the same substance in leaf-extract that caused roots to grow also promoted marked growth in thickness of young stems by stimulating the cambium, or layer of growth-cells that ensheathes stems under the outer bark or skin.

The two Oxford botanists, however, cautiously record some question whether the cambium-promoter is identical with auxin. They are continuing their researches, with this question in mind.

There are three known kinds of auxin, according to Dr. F. W. Went of the California Institute of Technology. Auxins A and B are very much alike in chemical makeup; auxin C differs somewhat from them. But all three are active in promoting plant growth. Dr. Went, together with his father, Prof. F. A. F. C. Went of the University of Utrecht, Holland, was a pioneer in the study of auxin action.

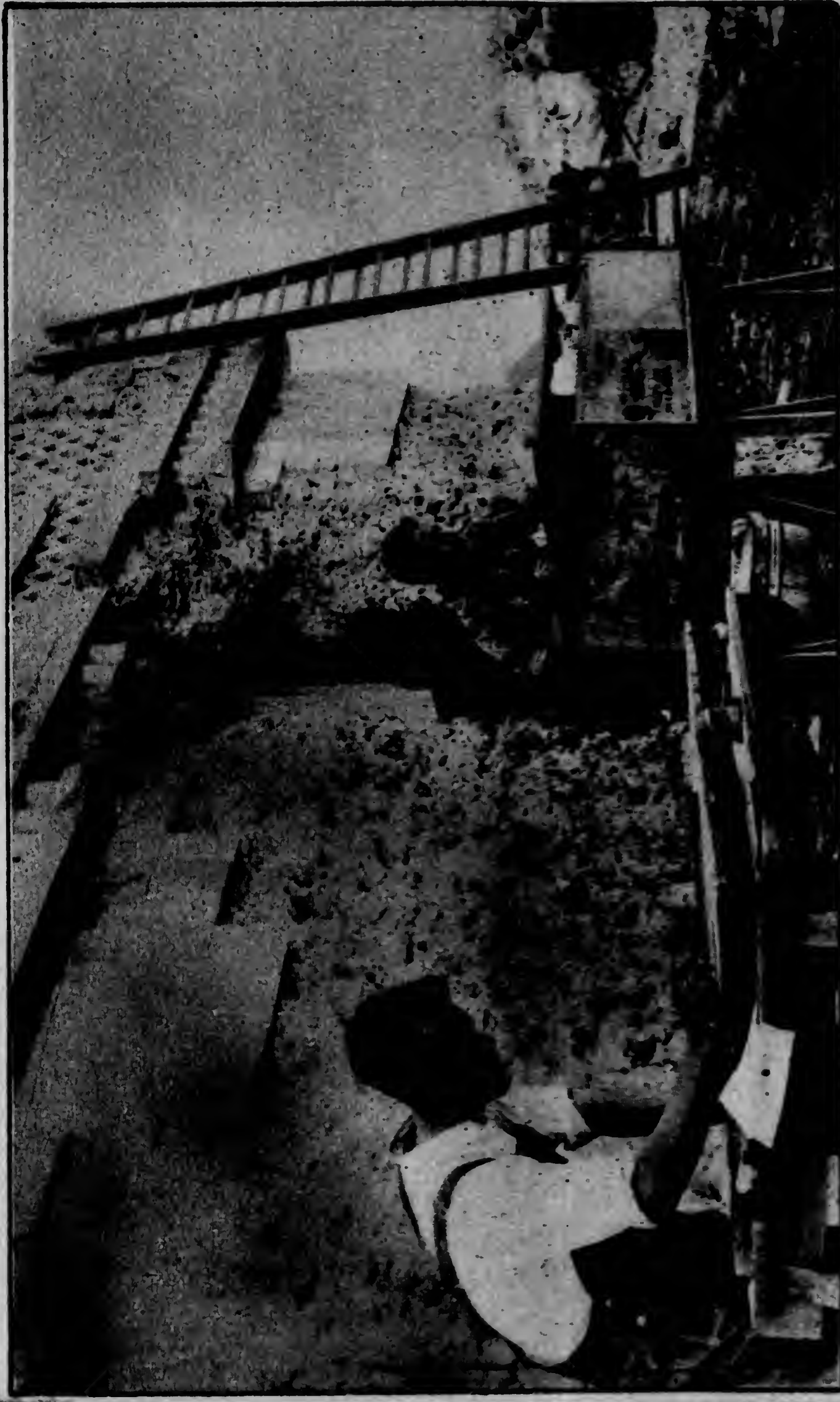
Science News Letter, February 16, 1935

The working career of a horse is estimated at about 15 years.



**THE REMAINS OF
A CIVILIZATION
IN AMERICA
WHICH ANTE-
DATES COLUM-
BUS: A WALL OF
ONE OF THE
BUILDINGS**

Built by the Mayas
of Yucatan, Where
Recent Discoveries
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Advanced the
Knowledge of the
Race 500 Years.
(Times Wide World
Photos.)

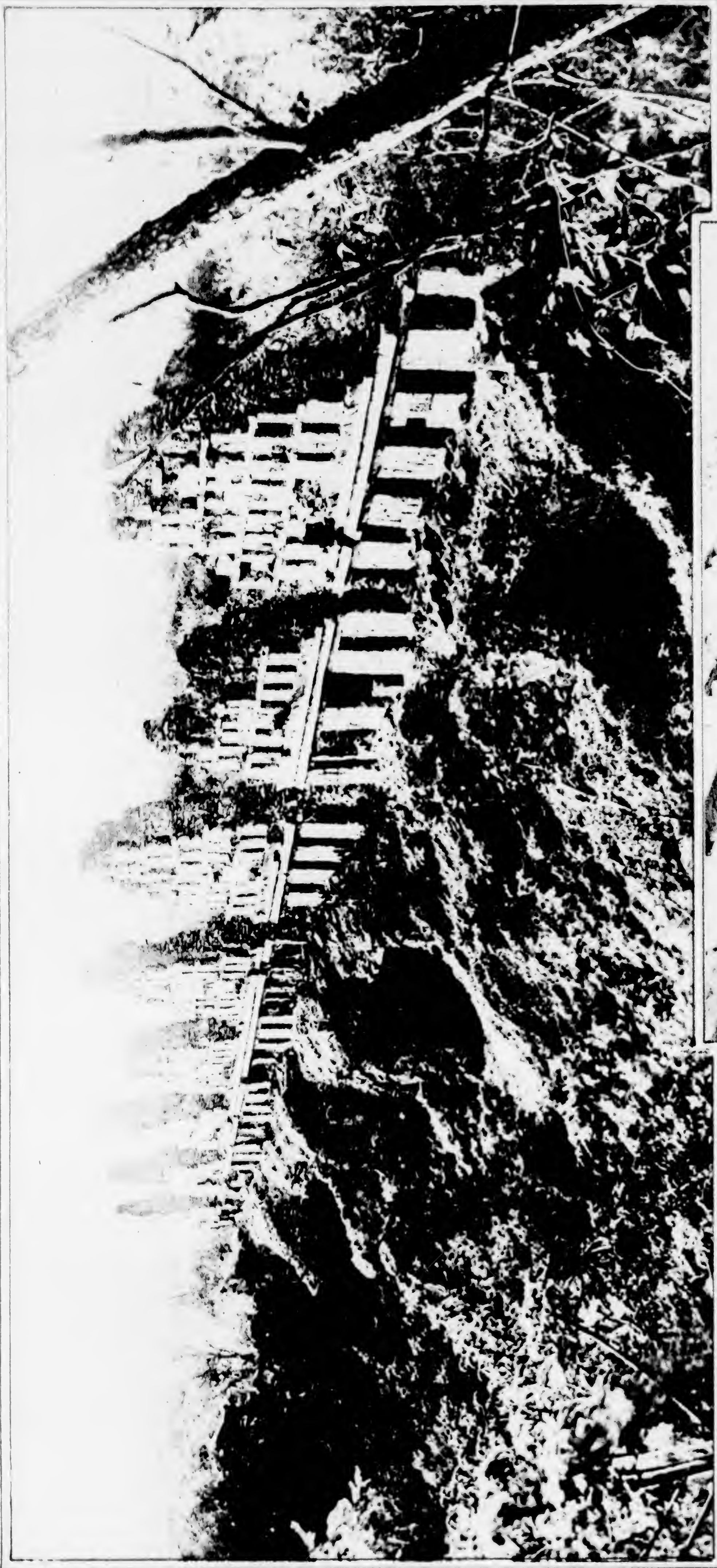


**DISCOVERIES IN THE EARLY
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**PICTURE WRITINGS OF A LANGUAGE ALMOST LOST TO THE
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Over One of the Temples Built by the Mayas at Uxmal, Yucatan, Which
Have Been Explored and Studied by an Expedition Sent Out From Tulane
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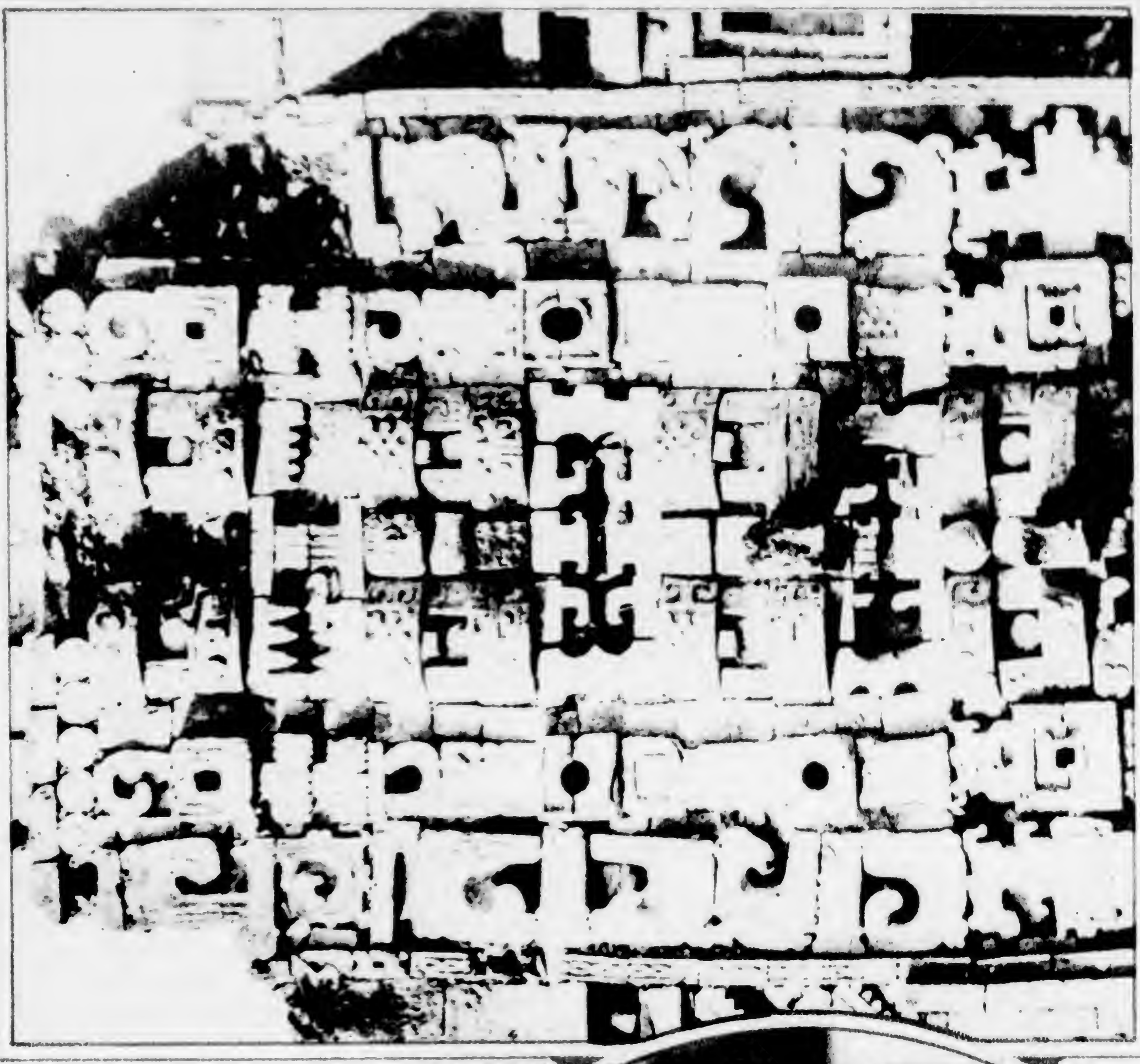
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Retake of Preceding Frame

RELIC OF LONG LOST CIVILIZATION



One of the rattlesnakes found from the "Court of the Thousand Columns," partially unearthed last year, in Yucatan, Mexico, by scientists of the Carnegie Institution.

ALTAR OF ANCIENT MAYAS UNEARTHED

March 15 1925

Painted by Artists Dead
1,500 Years—In Temple
in Yucatan.

A multiple painted altar, supported by more than 30 handsomely sculptured human figures, upon which ancient priests of the lost Maya civilization once performed their mysterious rites, has been unearthed in Yucatan by the staff that is conducting archeological excavations in Chichen Itza for the Carnegie Institution of Washington.

The altar had lain buried for untold centuries in a pyramid temple in the heart of the destroyed city that once was the gay capital of the astounding aboriginal civilization that reared itself on this continent about the time the western Roman empire was falling to pieces in the Old World.

It represents the most important discovery made by the archeologists since they resumed their excavations at Chichen Itza, about the first of February, and despite its age and the destructive jungle that had grown over it the altar was still in an excellent state of preservation.

Like Pyramids of Egypt.

Beginning their work in the court of the thousand columns, which was partially unearthed last year, the scientists soon came upon the entrance to the pyramid temple and immediately found evidences of important relics left by the people whose complete disintegration remains the outstanding enigma of early American history.

At the entrance to the temple, strangely resembling the pyramids of ancient Egypt in its architecture, stood columns beautifully sculptured, each representing a writhing rattlesnake. They were perfectly preserved, head and rattles both being intact. Inside were 20 large columns, also gorgeously carved.

One of the most remarkable features of the temple was the fact that original paintings executed upon the columns by artists perhaps 1,500 years ago are still plainly legible, and the many colors that the altar itself was painted remain brilliant and preserved today.

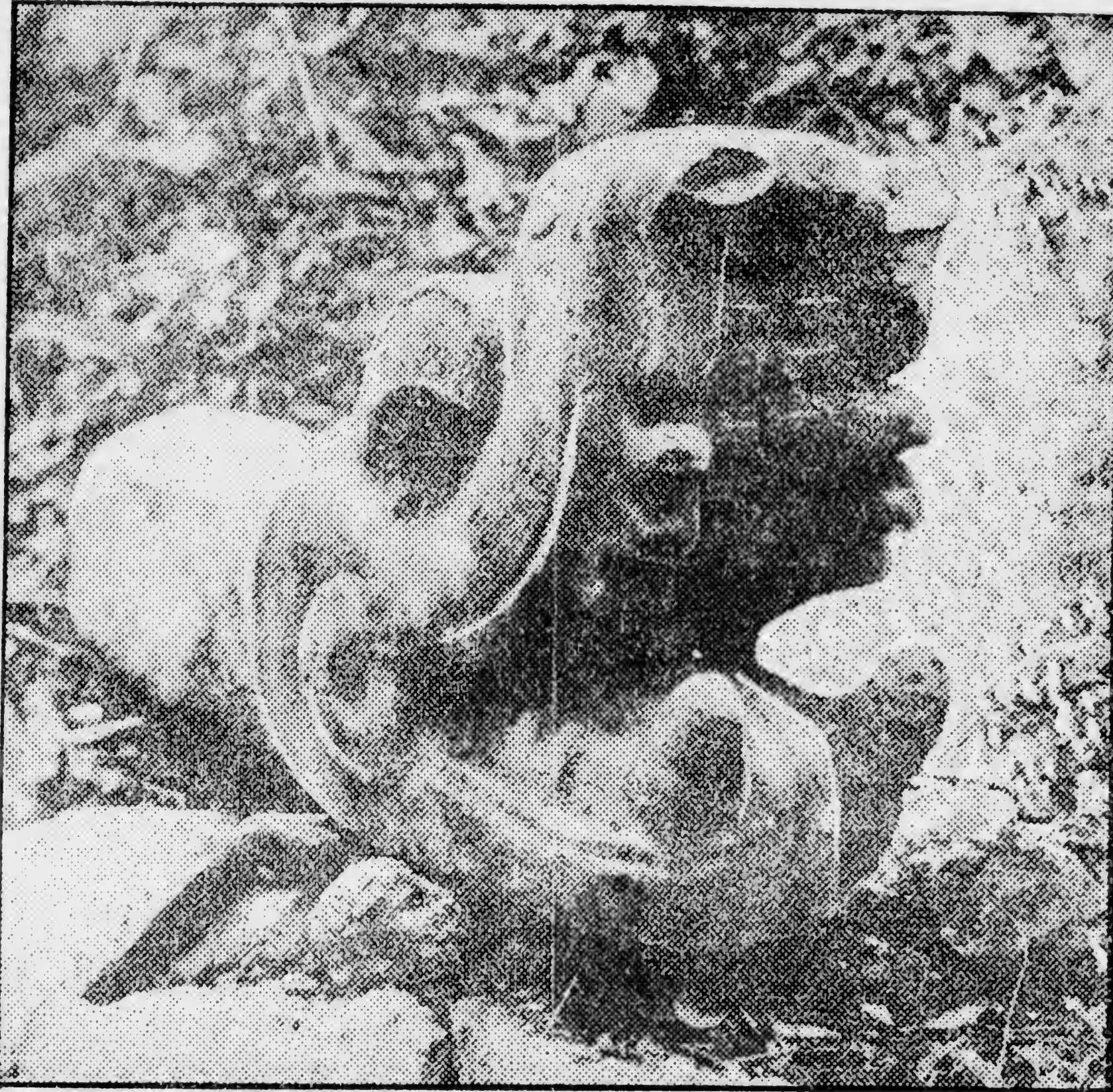
There are also evidences of beautiful paintings both on the inner and outer walls of the temple.

For Human Sacrifices.

Since it is generally accepted that the Maya people offered human sacrifices to their gods in times of war and drought, it is not unlikely that this altar was used for sacrificial rites. It was common for the Maya people to hurl their most gifted maidens into a deep sacrificial well as gifts to the god of rain.

News of the newly discovered altar was sent to the office of administration of the Carnegie Institution of Washington by Dr. Sylvanus G. Morley, in charge of the work in Middle American archeology.

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News of the newly discovered altar was sent to the office of administration of the Carnegie Institution of Washington by Dr. Sylvanus G. Morley, in charge of the work in Middle American archeology.

Retake of Preceding Frame

A HUNDRED skeletons and 2,500 records of the size and other physical characteristics of living modern Maya Indians of Yucatan brought back to Peabody Museum by Dr. and Mrs. G. D. Williams may give an insight into the kind of people who erected great cities and developed a culture in America long before the coming of Columbus. During an anthropometric survey of the Mexican state of Yucatan, Dr. Williams obtained information on 2,000 adults and 500 children of the descendants of the ancient Maya and also secured for scientific study the skeletons of a hundred present-day Mayas. Metabolic tests were included in the studies. The expedition that was in the field for eight months was under the auspices of the Bureau of International Research of Harvard University and Radcliffe College.

Sci. News, Science, March 9, 1928,

MAYAN INDIANS who lived in Central America more than 1,000 years ago practiced dentistry and knew something about the technique of drilling holes in teeth and filling up the cavity with metal. Two teeth containing circular holes filled with iron pyrites are among the discoveries reported by J. Eric Thompson, leader of the Captain Marshall Field Archeological Expedition to British Honduras, which has recently returned to the Field Museum of Natural History. The teeth were found in a vaulted burial chamber in the ruins of the Mayan city of Tzimin Cax, which means "Mountain Cow." A good collection of Mayan painted pottery was found in the chamber. Other burial chambers yielded skeletons and pottery types hitherto unknown in the Mayan art, also jade ear-plugs and apple-green jade beads. While digging in a large mound in the ruins of the city, the expedition made the first authenticated find of a mirror from a site of the Old Empire of the Mayan tribes, that is, from the period between 400 and 800 A. D.

Science News, Science, July 26, 1929,

Maya : Guatemala

Indians of Central America

124. SNAKE DANCES AMONG THE QUICHÉ
INDIANS OF GUATEMALA

FRANZ TERMER

Among the aborigines of Guatemala the custom of masked dances continues. They are performed on the occasion of the annual festivals. Dramatic and comic dances occur. Almost all of these dances, so far as they have been described, occur in the region of the Quiché, in the highlands of Guatemala.

They have never been described in detail but are known in the Republic as dances of the "Gracejos", or snake dances. The author had occasion to witness several of these. The participants performed certain rites several days before the festival, and three days before the dance they hunt for snakes which are placed in a certain house. All the dancers are men, but only one of them, the chief of the dancers and guardian of the snakes, dresses as a woman. The masks are of a particular type and different from those used in other dances. The dress is the usual one, but very shabby. The festival consists of comic and obscene dances of a sexual character, until the moment when the person dressed like a woman, or somebody else, brings out the living snakes which are of various classes. The dancers take them and place them inside their shirts until the snakes fall down to the ground. After this follows a flagellation with whips or nets, and this ends the ceremony. This dance is very old and has no relation to any of the Christian festivals. There are no speeches in Spanish and only improvisations in Quiché with jokes.

These are probably survivals of fertility ceremonies. Rites of this kind were celebrated before the conquest at the festival "Atamalqualiztli" described by Sahagun. It may be that these dances came to Guatemala with Mexican emigrants.

Mayan Throne Discovered In Guatemalan Wilderness

ARCHAEOLOGISTS exploring in the Maya country in Guatemala have discovered something new, the real throne where a ceremony recorded in Mayan art took place.

Word of the unusual discovery has just been received at the Museum of the University of Pennsylvania. The expedition is one sent out by the Museum under direction of Dr. J. Alden Mason. The archaeologists are exploring ruins of the old Mayan city of Piedras Negras, meaning "black stone."

Last year the same expedition found a masterpiece of Mayan carving in the form of a door lintel covered with picture writings and groups of Indians. The artist had made a sculptured record of some important ceremony at a throne.

Now, digging at the same ruins where the masterpiece was found, Dr. Mason has discovered the very throne, with its beautiful, ornate background, which the Mayan Phidias portrayed. There is no doubt, he reports, that the ceremony portrayed on the lintel was performed at Piedras Negras upon this throne.

The throne had an impressive setting. At the top of a long, fine stone stairway stood a colonnaded structure. And against the back wall of this structure, was the throne.

The expedition has been excavating at the pyramid where the lintel was unearthed last season, and also at another pyramid. Under this latter pyramid two temples have been located. The nature of these hidden temples is still to be determined.

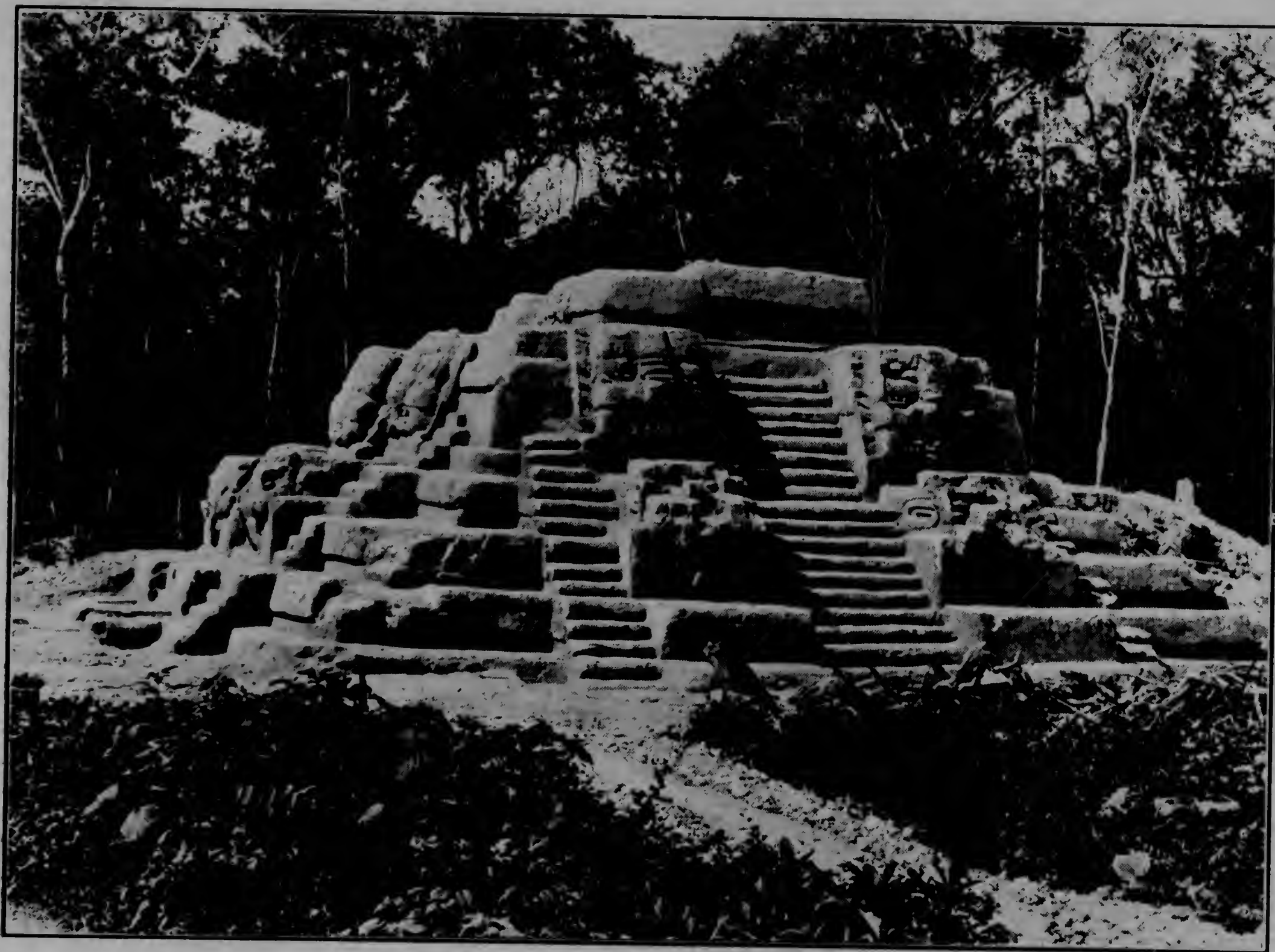
FRESH DISCOVERIES IN MAYA EXPLORATION

The results of the Maya exploration work of the Carnegie Institution of Washington were described at the International Congress of Americanists in September. Dr. A. V. Kidder, Dr. S. G. Morley and other members of the archeological staff presented reports covering a season which has thrown fresh light upon that remarkable race of aborigines which the New World developed. Two events in particular stamp the 1928 working season as having been one of unusual richness—the excavation of Pyramid E-VII at Uaxactun (Wah-shawk-toon), Guatemala, and the discovery of an ancient ceremonial treasure in the Temple of Warriors at Chichen Itzá, Yucatan.

Some two thousand years ago the inhabitants of a distant city in what is now the northernmost department of the Republic of Guatemala built a wonderful pyramid.

This pyramid, 85 feet square at the base and 25 feet high, was ascended by four stairways, one on each side. Colossal masks of fine lime stucco, the upper pairs fashioned in the likeness of grotesque human heads, the lower pairs after the manner of serpents' heads, flank these stairways and, like grim sentinels, guard the approaches to the holy region above.

Time passed. Probably very near the beginning of the Christian era this beautiful pyramid, built of uncut stone,



ANCIENT MAYA TEMPLE

AT UAXACTUN (WAH-SHAWK-TOON), GUATEMALA, UNCOVERED BY THE CARNEGIE INSTITUTION OF WASHINGTON. THE SUMMIT IS REACHED BY FOUR STAIRWAYS, EACH FLANKED BY COLOSSAL MASKS OF FINE LIME STUCCO, THE UPPER PAIRS REPRESENTING GROTESQUE HUMAN HEADS, THE LOWER PAIRS FASHIONED AFTER THE MANNER OF SERPENTS' HEADS.

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Retake of Preceding Frame

and faced with dazzling white stucco was covered up, completely buried by the ancient inhabitants of the city. They built around it and over it a covering of rough rubble which, while it completely concealed the original pyramid, doubled the height of the new pyramid and also increased the area it covered.

Time and the growth of forest trees had almost completely destroyed its exterior finish, but enough remained to show that it had been a very steep structure some 50 feet high. Evidence is at hand to indicate that the new pyramid was used as the point of observation in a gigantic sun dial by means of which the positions of the equinoxes and solstices were determined for priests and people. Why the older and probably more beautiful pyramid was covered up and completely hidden, however, still remains an archeological mystery.

The original pyramid is perhaps one of the most beautiful examples of ancient American architecture that has come down to us. Its harmonious proportions, its pleasing silhouette, its dignified bearing, its dazzling silvery white finish, make it one of the most satisfying pictures of the past to be found anywhere in the world.

The top of the earlier pyramid is covered with a floor of hard white plaster painted a deep red. As this shows no traces of walls, or of any superstructure, one is forced to the conclusion that no building had ever surmounted it. It would seem to have been a place of sacrifice, a holy place in a very real sense.

In the coarse rubble forming the hearting of the apex three cysts were found, one of which was a grave of large, cut, untrimmed stones and mud. The grave contained the headless skeleton of a female, whose age was estimated at twenty-five, which lay fully extended, face down, the feet towards the west. Another cyst contained six pots, three of

which were of plain red ware with flaring rims and three of plain brown ware with covers. The vessels were protected from the weight of the superimposed earth by large stones. The third cyst also contained pottery in which various articles were found, such as seeds, shells, dried gummy materials, pieces of obsidian, and an obsidian lancet, extremely sharp and well-made.

Three hieroglyphic stone monuments in the plaza of the ancient city were found to have been erected at the same time, and two of these have the very early Maya date 8.16.0.0.0, corresponding to 97 A. D., inscribed upon them. How much older than this date the earlier stucco pyramid may be, it is impossible to say. It would seem reasonable to suppose that at the time it was covered up it had been in use a century or more. If 97 A. D. marks the date when the older temple was covered, as is probable, then 2,000 years is not far from the real age of the original structure.

Having been in good repair when it was entombed by the erection of the secondary pyramid, and having been protected by the latter through the centuries, the primary pyramid, judged as a whole, may be said to be in practically the condition it was in when it was buried 2,000 years ago.

WE wish to acknowledge our obligations to The American Geographical Society for the loan of the map of the Arctic Basin from "Problems of Polar Research," which appeared in the September number of THE SCIENTIFIC MONTHLY, and for the cuts from Professor Davis' book entitled "The Coral Reef Problem," which accompanied his article in the number for October. We regret that the credit line was accidentally omitted when these illustrations were printed.

Scientist Takes Census of City Centuries Dead

TAKING A CENSUS of an American city that flourished 2,000 years ago is one of the newest feats of archaeological research, reported by Oliver G. Ricketson, Jr., of the Carnegie Institution of Washington, in a recent lecture at the Institution. Mr. Ricketson announced results of the latest explorations at the ruins of Uaxatun, in Guatemala, the oldest Mayan site so far discovered.

The census of Uaxactun was taken, not by counting heads in the usual manner of census taking, but by counting houses, Mr. Ricketson explained. The site of Uaxactun has at the center a plaza and pyramid-shaped monuments where Mayan priests and astronomers conducted religious ceremonies and watched the skies. Out from this civic and religious center radiated the residential section, so to speak, consisting of thatched huts surrounded by little farms. Even after so many centuries, the house mounds, or low platforms on which the huts were built, may still be seen and counted; and Mr. Ricketson said that a cross-section of the area has been examined by counting house mounds in different directions as far as ten miles out from the civic center.

There were 78 houses per square mile of habitable land, it has been determined. And, considering that ten miles is about as far as an Indian would walk to "go to town," Mr. Ricketson set that as the probable outside boundary. On this basis, Uaxactun had a population of about 48,000 Indians in its prime.

Science News Letter, December 5, 1931

EXCAVATIONS AT UAXACTUN¹

By OLIVER G. RICKETSON, Jr.

ARCHAEOLOGIST, CARNEGIE INSTITUTION OF WASHINGTON

IN the New World three distinct aboriginal civilizations developed three apogees of indigenous culture. These are the Aztec in the Valley of Mexico, noted for their military organization; the Inca in the Highlands of Peru, whose despotic, if beneficent, paternalism permeated every fiber of their politico-social fabric, and the Maya of Middle America.

We may justly rank the cultural achievement of the last as intellectually the highest, in that their genius developed not only an accurate calendric system, whose numeration called for the independent invention of zero and place-numeration, but also the orderly development of a pleasing architectural style and its concomitant decoration. Their architecture never violated the principles governing proportion and mass; its decoration, even when it appears florid to Western eyes, observes the fundamentals of design, and in their handling of perspective, the Maya surpassed all the ancient civilizations of the Old World previous to the Minoan.

It is with a sample of this highest aboriginal American civilization, as exemplified in the ruins of Uaxactun, Guatemala, that we are here concerned. So great are the lacunae in our knowledge, however, that the original name of this site is forever lost to us. It was given its present name on May 5, 1916, by its discoverer, Dr. S. G. Morley, an associate of this Institution.

On entering A-Group the first object that met his eye was Stela 9, bearing the Maya calendric inscription 8. 14. 10. 13. 15. 8 *Men* 8 *Kayab*—or June 10th, 68

¹ A lecture delivered at Carnegie Institution of Washington, November 3, 1931.

A. D. Since this was the first monument bearing a cycle 8 glyph, Dr. Morley named the ruin "Uaxactun"—from the Maya *uaxac*, meaning eight, and *tun*, stone. It is the oldest dated stela so far discovered in the Maya area. The latest date found at Uaxactun corresponds to 639 A. D. So that we have here a dated span of 571 years; that is to say, a period three and one half times longer than the United States have existed as a free and independent country. Yet archeology has afforded us every proof that Uaxactun was occupied long before the erection of the earliest stela—just how long it is difficult to say, but the sixth century before Christ would be a conservative estimate. Since we have positive proof that the Maya reused stone stelae, effacing one date to set up another, this custom offers a partial explanation for the lack of earlier dated monuments; but perhaps a better explanation lies in the supposition that dates may well have been carved first on wood rather than on stone. With the climate of Yucatan such as it is we can never hope to find traces of these.

Before I describe the actual excavations themselves, permit me a moment to describe two basic factors—environment and race—an understanding of which is necessary for a clear comprehension of the situation.

Environment is a basic factor which can not be ignored. As you are all aware, the peninsula lies within the tropics; the year is characterized by two seasons, the "rainy" and the "dry." Since the whole region is composed entirely of porous coralline limestone, permanent surface water is rare, despite a heavy rainfall; in fact, the present sur-

face-water supply is so scant that it could not have met the needs of the ancient Maya during the dry season when their population was at its peak.

Various theories have been advanced to explain this condition, of which the most convincing is that of C. Wythe Cooke after a visit to Uaxactun this year. This theory is that the present-day *bajos* or logwood swamps, covering about 40 per cent. of the terrain, were formerly shallow lakes. The rapid erosion of the surface soil, following deforestation by the Maya, has silted up these lakes. Beyond the geologic evidence supporting this theory, namely, that the mud of these swamps is composed of black carbonaceous clay and disintegrating limestone—we should remember that the district itself is called the "Peten," a word meaning "lake" in Maya—and that the silting up of these former lakes would

react very unfavorably upon the environment of the ancient inhabitants in at least two ways: first, because the origin of the silt is the surface soil of the higher land, composing the terrain suitable for agriculture. Its complete denudation would mean crop-failure and the consequent collapse of a civilization based on corn; and second, because the transformation of a lake into a morass not only eliminates rapid communication and easy transport by canoe, but changes the whole aspect of the region and renders land-transport well-nigh impossible by the development of such extensive swamps that they can not be avoided and must be crossed.

The normal increase of population is sufficient to account for a slow but steady expansion in search of new land; if, in addition to this population increase, we have also the progressive onset of these



FIG. 1. PRIMITIVE TYPE FIGURINES

SHOWING FLATTENED FOREHEADS CHARACTERISTIC OF ANCIENT MAYA SKULLS. UPPER RIGHT—FROM BLACK DIRT STRATUM, UAXACTUN. AT LEFT AND LOWER RIGHT—FROM PALENQUE.

mutually interactive conditions, soil-denudation and lake-silting, we have a condition wherein expansion will be under forced draught, so to speak. This expansion, however, is no more of an exodus than was our own westward expansion across the Great Plains in the nineteenth century.

The sharp division of Maya history into two epochs—a so-called “Old Empire” in the south, abandoned in the seventh century A. D., to be followed later by a “New Empire” in the north, will have to be revised in the light of our present knowledge. The earlier centers were not abandoned; they merely yielded their prestige to new rivals. Incidentally, we should also explain that Maya ruins are not the remains of extensive cities; the Maya were not an urban people, but agriculturists. Even in the large, multi-chambered buildings of northern Yucatan there would not be housing facilities for a large population.

The ruins that we see to-day are the civil and religious centers to which the surrounding farmers flocked on market and feast-days. Proof of this statement is evidenced by the fact that the low platforms forming ancient house-mounds extend throughout the jungle in every direction and without demarcation between one center and another.

By taking a sample count of these mounds and allowing the jurisdiction of such a center as Uaxactun to extend ten miles in every direction, we arrive at the conclusion that the population could not have been less than 48,000, providing that only 25 per cent. of the house-mounds were simultaneously occupied. If all the arable land were equally divided among all the house-mounds, each householder would own a lot 125 yards square. With intensive agriculture, such a lot would produce sufficient, and more than sufficient, corn, beans and squash for one family.

Our second basic factor is race. We definitely know that at Uaxactun we are dealing with a Maya race pure and simple. No evidence is at hand that any other type ever occupied this site. Such skeletons as have been encountered indicate that the individuals were markedly brachycephalic, of relatively light skeletal set-up and of equal stature with living Maya stocks as found in northern Yucatan and the Highlands of Guatemala to-day.

Two wide-spread characteristics of ancient Maya skulls are also seen at Uaxactun—fronto-occipital deformation, in which the forehead is purposely flattened (see Fig. 1), and the filing of the incisor teeth. We therefore assume, in the light of our present knowledge, that the first and original settlers of Uaxactun were of Maya stock, no evidence of a preceding race of inhabitants ever having been discovered. Not only is there no archeological evidence, but in the Book of Chilam Balam of Chumayel, which recounts legendary lore of the Maya, there is this statement in regard to the arrival of the Mayas. “They named the district, they named the wells, they named the region, they named the land, because no one had arrived here, here in Ucalpeten, when we arrived here.” If this is the case, then, the living Maya can claim 2,500 years of continuous residence in the Peninsula of Yucatan, during which time the majority of their race has maintained its physical characteristics even up to the present day, and this in spite of the shock of the Spanish Conquest.

With these two factors in mind, let us now turn specifically to the ruins of Uaxactun themselves. These lie in the north central portion of the Department of the Peten, Guatemala (see map, Fig. 2) at the geographic center of the Yucatan Peninsula, in a dense high jungle which is to-day completely devoid of all permanent human habitation between



FIG. 2. SHOWING THE LOCATION OF UAXACTUN, GUATEMALA
SITUATED AT THE GEOGRAPHIC CENTER OF THE YUCATAN PENINSULA, IN A DENSE, UNINHABITED
JUNGLE.

Peto, Yucatan, on the north and Flores, Guatemala, on the south.

So difficult are the conditions of travel that we may safely say the only people who penetrate the region are archeologists in search of ruins and chicle-bleeders in search of the indispensable ingredient of chewing-gum—the gum derived from the latex of the sapote tree. Although Uaxactun lies only 120 miles in an air line from Belize, British Honduras, yet the journey generally consumes a week or more—three or four

days to ascend the Belize River in a 60-foot launch, and five days riding a mule as it alternately flounders through logwood swamps or crawls along the tortuous trails at the bottom of the jungle.

Twelve or fifteen miles is considered a day's journey during the "dry" season—less when the rains render the trails barely passable. The day's journey is also controlled by the location of *aguadas* or water-holes, for this is a country where running streams and springs are unknown, and camp must

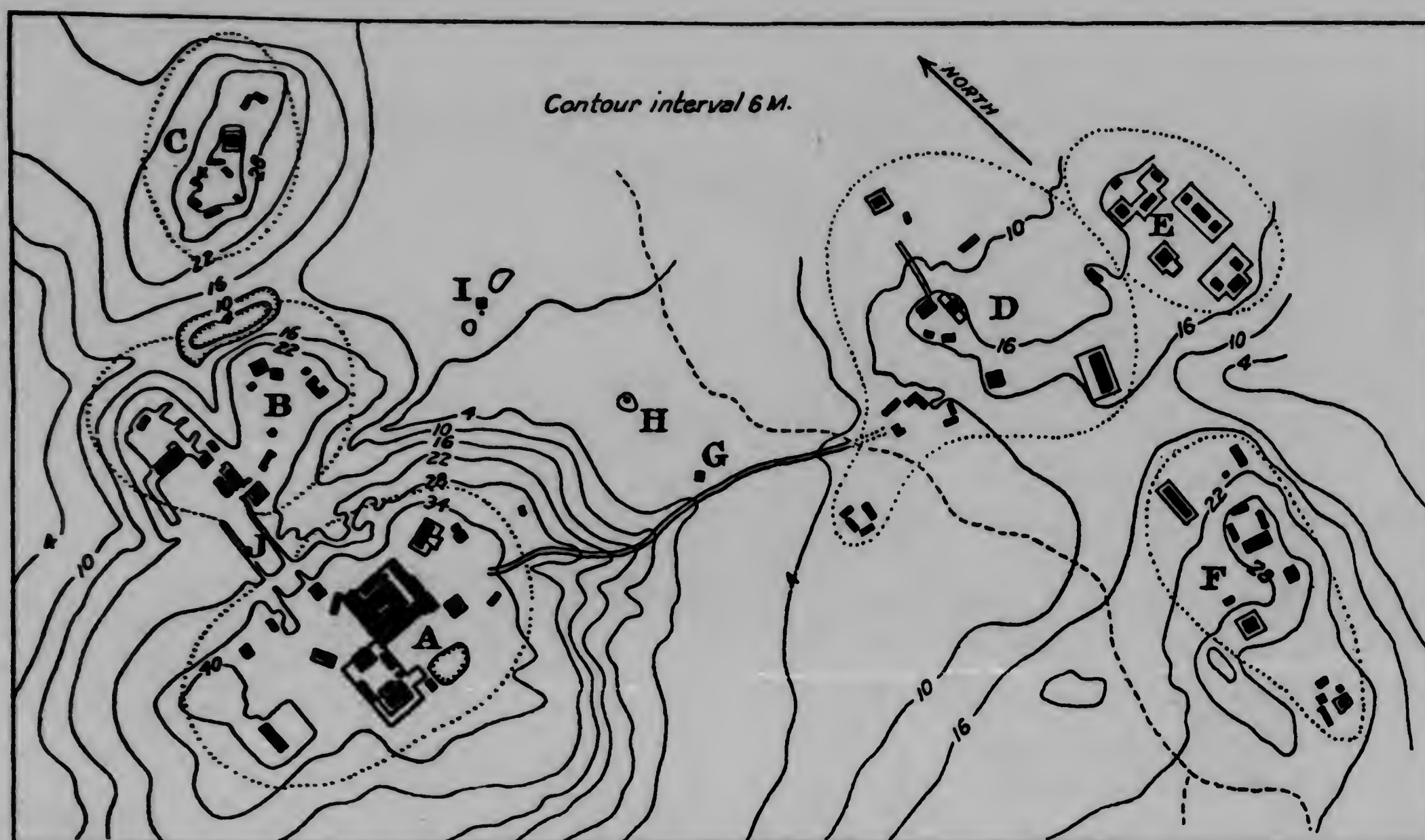


FIG. 3. MAP OF UAXACTUN (AFTER BLOM)
 SHOWING: A, B, C, D, E, F, IMPORTANT GROUPS OF STRUCTURES; G, LABORERS' CAMP; H, AGUADA; I, STAFF HEADQUARTERS.

be made at water, of course. Perhaps the strongest impression the jungle makes on the outsider entering it for the first time is a sensation akin to suffocation—not from the heat, because the sun never penetrates the bottom, but from the subdued, green light and the still, silent air, unruffled by the slightest breeze.

Contrary to popular opinion, the monotony of the jungle trail is seldom broken by animal life, if we except the wail of the howler monkey. Although there are two of the large cats, the jaguar and the puma, and several of the small, such as the ocelot, these are nocturnal, as is also the largest denizen, the tapir. Two kinds of deer occur, and various small mammals, such as the armadillo, the agouti, the coatimundi and the more rare kinkajou.

On the other hand, bird-life is teeming, and contains one unique species not seen elsewhere—the beautiful ocelated turkey of Yucatan. Snakes, though well represented, find much of the country

too wet; the best-known species of poisonous snake include the fer-de-lance, the tropical rattler and the coral-snake, but, again, contrary to popular opinion, these do not offer any particular hazard, and snake-bite would result only from treading directly on one. In fact, life in the jungle is a great deal safer than in one of our modern cities—the only enemies being malarial fever and intestinal infections, neither of which are even remotely liable to prove fatal with our present-day medical equipment. I may add, however, that if the safety-factor compares well with that of our modern metropoli, the comforts certainly do not. There is no more comparison between a Pullman and a pack-train than there is between a modern hotel and a bush *champa* (lean-to).

But we are digressing from our main subject; the map of Uaxactun (see map, Fig. 3) will show us that these ruins occupy the artificially flattened tops of natural hills, as is so characteristic of Maya sites in the Peten. More or less

centrally located may be seen the Main Aguada, north of it the Institution's field headquarters and south of it the laborers' camp. On the west, crowning the highest eminence, is Group A—here we have a standing building A-XVIII not of a temple but of a domiciliary type facing the East Plaza; the South Plaza bounded on the north by an entirely fallen but extremely massive and complex structure, A-V, containing 3 sunken courts; on the east by the South Terrace; on the west by the South Court, and on the south by the natural slope of the hill.

The South Court, already mentioned, is in itself a complete temple-plaza unit. Its chief temple, A-I, surrounded by 9 stelae, is the site of an important pottery cache which I will describe later on. North of it lies the Main Plaza, in which stands Stela 9—bearing the earliest date, 68 A. D.—from which extends an artificial causeway along a natural ridge to Group B.

This group, as can be seen, occupies the double top of a forked hill—the western plaza is called the Main Plaza, the other the eastern. B-Group stands 10 meters lower than A-Group. It is

composed of large low mounds, of secondary importance to A-Group.

The third group, C, is an irregularly oriented collection of 9 mounds, crowning the top of a hill northeast of B-Group, and separated from the East Plaza of the latter by a steep-sided ravine. It contains no stela.

These three groups comprise the portions of Uaxactun west of the aguada. East of it are the two widely scattered groups D and F and the compactly built temple-plaza unit called Group E, or the Group of the Solar Observatory. This latter is the site of the excavations carried out by the institution during the past six years, and was chosen for two reasons. (1) The three stelae in its plaza, though not the earliest, still bear very early dates—98 A. D. and 235 A. D. (2) Frans Blom, who visited Uaxactun for the Carnegie Institution in 1924, noted that certain lines of sight from Pyramid VII to Pyramids I, II and III, respectively, corresponded very closely to the amplitudes of the sun at the solstices and the equinoxes. Excavations have proved that the positions of these temples are closely related with these four cardinal markers of the year,

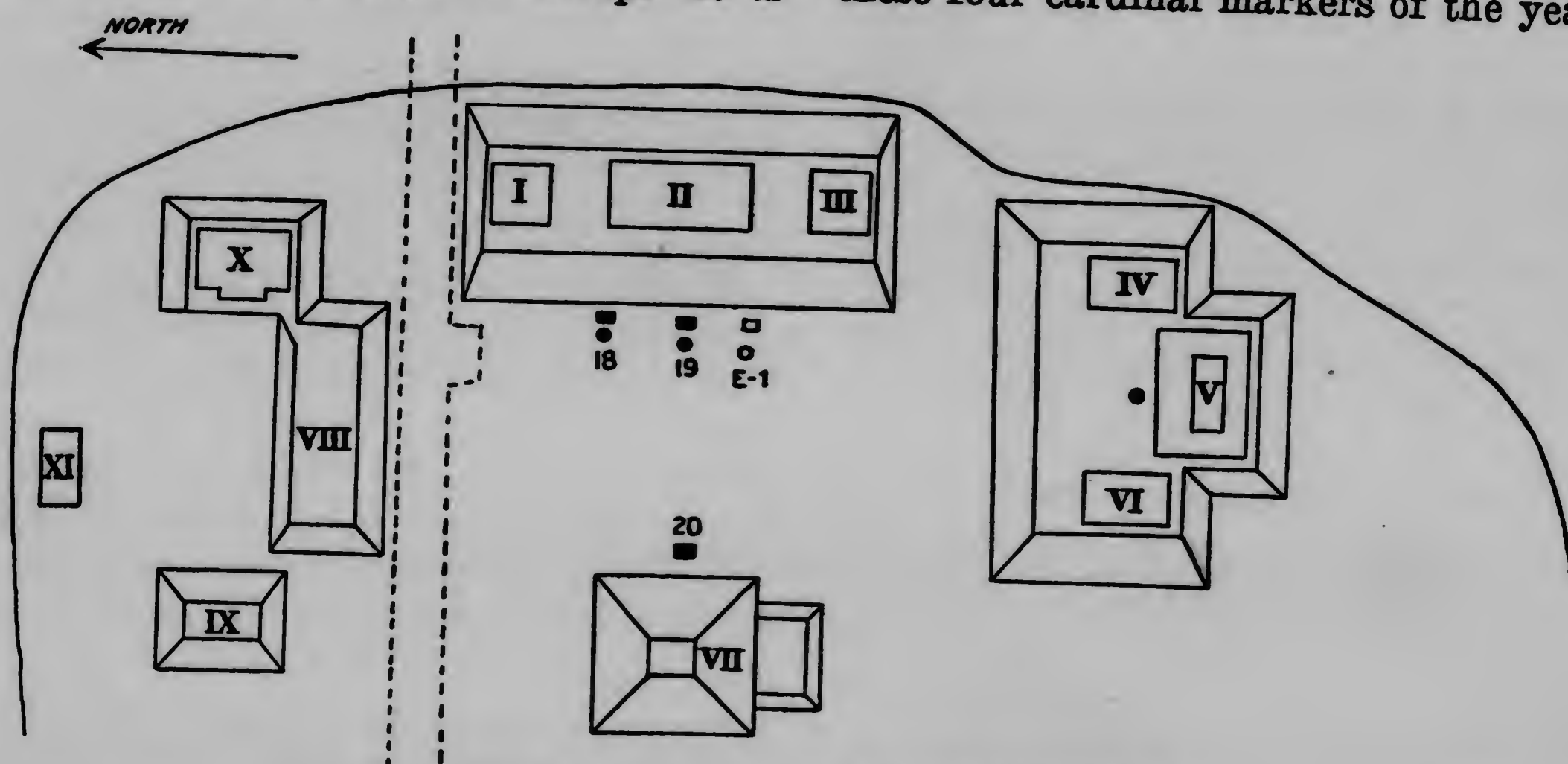


FIG. 4. GROUND PLAN OF GROUP E
SHOWING LOCATION OF THE MAIN TRENCH. THIS GROUP COMPRISES ELEVEN MOUNDS, GROUPED AROUND ONE MAIN PLAZA.

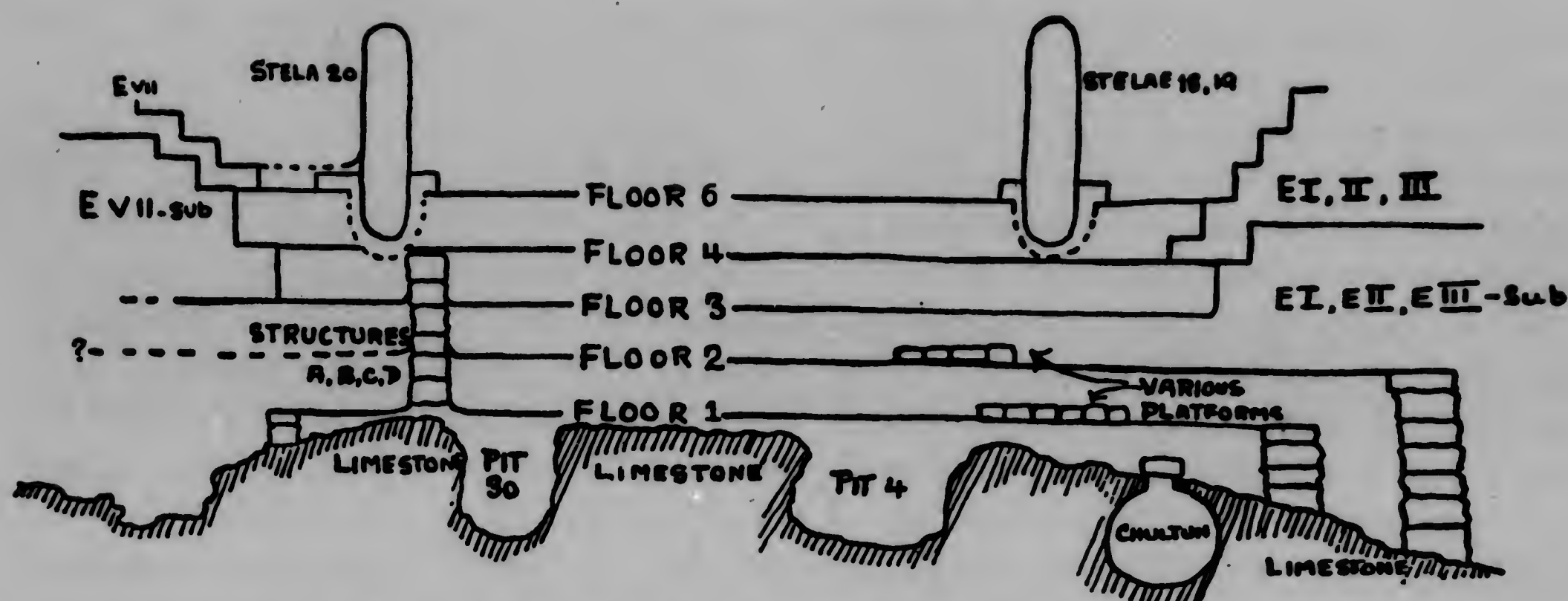


FIG. 5. DIAGRAMMATIC CROSS-SECTION OF E-PLAZA

SHOWING SUPERPOSITION OF PLAZA FLOORS. FLOOR 5 HAS BEEN OMITTED. STELA 20, DATED 235 A. D.; STELAE 18, 19, DATED 98 A. D.

probably for purposes of geomancy rather than for actual observation in a modern astronomic sense.

The group was also chosen for excavation because of its compactness, which would permit its thorough examination in a period of five years.

An examination of the map (Fig. 4) shows that this group comprises eleven mounds, grouped around one Main Plaza and a smaller North Court. All but one are in complete ruin.

Temples I, II and III surmount a 15-foot mound, closing the main plaza on the East; Temples IV, V and VI surmount a similar mound, closing the main plaza on the south; Pyramid VII stands solitary on the west. It was from a position on the stairway leading up to this structure that the lines-of-site to I, II and III marked the cardinal points of the year. On the north the plaza is closed by a long, enigmatic mound, VIII, whose adjacent structures, IX on the west and X on the east, enclose, with the aid of Pyramid XI on the north, the North Court. Temple X is partially standing, a condition found elsewhere in Uaxactun only at A-XVIII.

Temples I, II and III were those first excavated. These were found to consist of an outer and inner room, the latter invariably containing a low masonry

altar. In the floors of all these temples were small circular cists with caches of two types; one type consisting of two flat-bottomed redware dishes with flaring rims, laid the one inverted over the other, containing in the space between them a human skull. Inasmuch as the first few cervical vertebrae were found beneath each skull, it is evident that the head must have been severed from the body—and that we therefore are not dealing with a secondary skull burial, but with human sacrifice.

The second type of cache consisted of a small cylindric jar, generally lidded and barrel-shaped, which often contained a red powder—hematite—or a stone object. The most striking object found in this type of cache was a small archaic green mudstone human figurine, represented as squatting. This figurine has been called crude because early and therefore primitive, and it has been called crude because late and therefore degenerate. There is no doubt in my mind that it is primitive, but its manufacture long anteceded the erection of the temple in which it was found.

Opposite the three temples just described stood Temple VII. This steep-sided pyramid originally stood 50 feet high, but the dilapidated character of its masonry precluded the determination of

any architectural features other than that a stone-balustraded stairway once ascended its east face; just how far we do not know, for unlike the usual Maya pyramid, this was not a substructure mound with a flat top whereon a temple was erected. It continued up to a more or less sharp peak (Fig. 7).

As excavations proceeded around the base of this pyramid in a vain effort to find definite remains of wall stones *in situ*, a hard, perfectly preserved stucco surface was found directly beneath it,

which upon further investigation revealed itself as an earlier pyramid completely covered over and preserved by the later one. This pyramid was called E-VII-sub and was eventually found to consist of a low terraced platform ascended on all four sides by stairways (Fig. 8). On its top sat another platform, access to whose top was had by only one stairway on the front or east.

All these stairways—five in number—were flanked by grotesque stucco masks built up over stone cores—the four

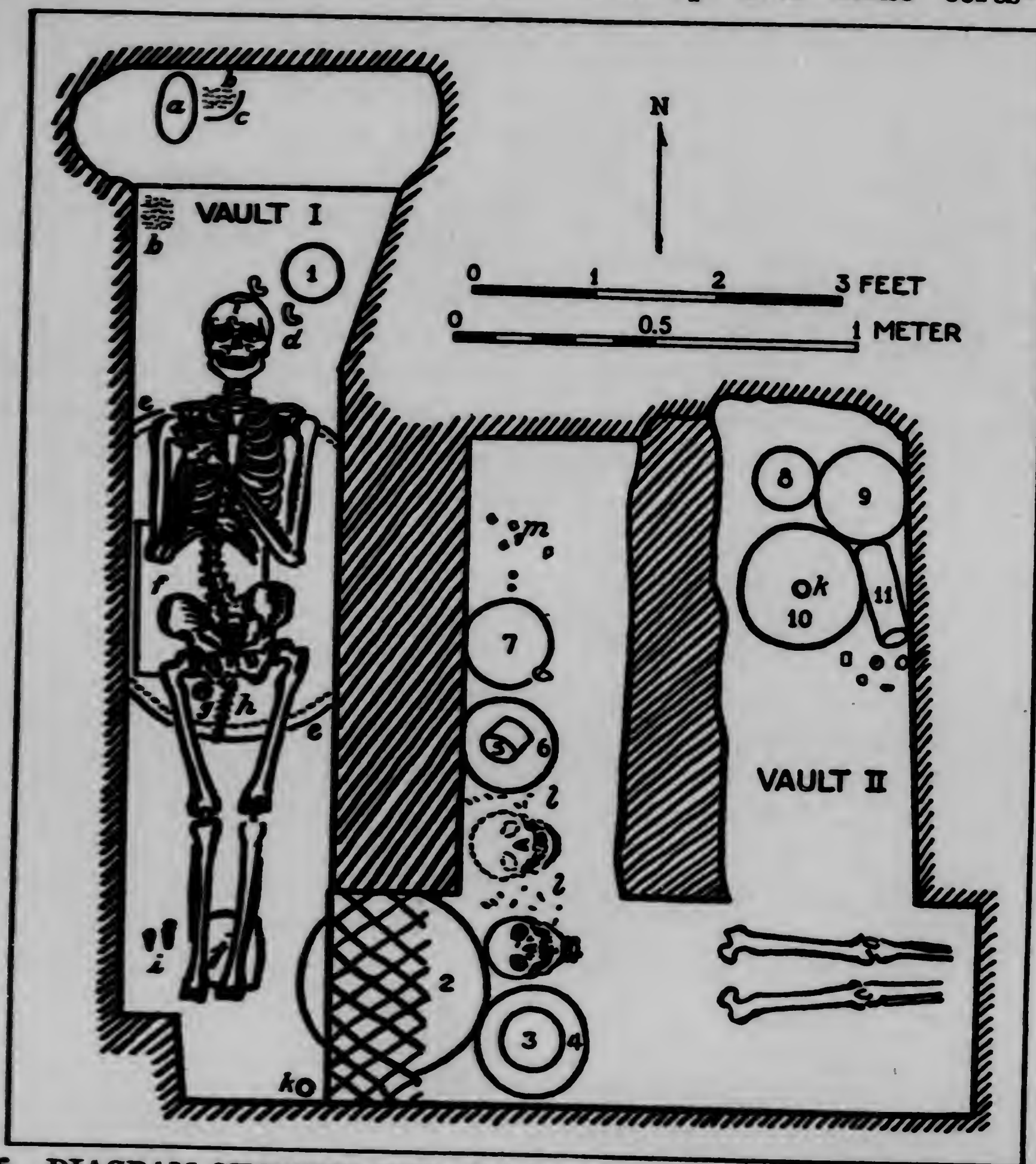


FIG. 6. DIAGRAM SHOWING THE BURIAL VAULTS AND THE LOCATION OF THEIR CONTENTS.

A, FRAGMENTARY SKULL OF LARGE MAMMAL. B, B, CARVED PIECES OF BONE PIERCED FOR USE IN A NECKLACE. C, FRAGMENT OF POTTERY VESSEL. D, SEA SHELLS. E, E, AREA OF CHARRED WOOD UNDERLYING SKELETON. F, HOLE BELOW CHARRED WOOD AREA. G, LARGE JADE BEAD. H, TAIL OF STING-RAY. I, DEER ANTLER. J, LARGE RECTANGULAR BONE (TURTLE?). K, K, JADE BEADS. L, L, HUMAN TEETH. M, IRON OXIDE. 1-11, POTTERY VESSELS.

main stairways of the supporting platform having two such masks on either side, the single stairway of the upmost platform having but one. There are therefore 18 masks in all, the general design of which does not conform to what we may call Classical Maya, but is yet so Maya in feeling that we have referred to it as Primitive Maya. These masks, roughly eight feet square, all represent grotesque human faces with open slit-like mouths in which exaggerated teeth are shown. Their general expression is one of ferocity. They have all a rolled ornament over the nose, and a broad band across the face at the level of the nostrils, reminiscent of a nose plug. Perhaps they carry a suggestion of the rain-god Tlaloc. Masks of similar motif, but broken down into greater conventionality, have been reported by Merwin from Holmul, a near-by ruin with which certain periods of Uaxactun pottery are to be associated, as we shall see.

Important as this discovery of an extremely early type of Maya architecture may be, the scientific importance of less spectacular excavations is even greater. This resulted from the sinking of an elaborated network of trenches into the very plaza itself. The photographs of these trenches will give some idea of their size—the first one, that of the main north-south trench—shows us how this trench appeared at the conclusion of the 1929 season (Fig. 9). It has been dug down through six superimposed plaza floors, the one overlying the other.

The six plaza floors extending across the plaza were found to overlay a deposit, varying in depth, of a black earth (Fig. 5). Beneath this was the basic limestone, so that we are more than reasonably certain that in this case we have reached bedrock.

The inferences from these trenching

operations may be summarized as follows:

(1) Pits and bottle-shaped chambers called *chultuns* were found artificially excavated by the Mayas in the solid limestone at depths of 15 feet below the present plaza surface.

(2) All soil from limestone up to the present surface bore traces of man's presence in one form or another—such as burials, worked shell or flint or obsidian, and broken fragments of pottery.

(3) The lowest layer, the so-called Black Dirt, underlying the main plaza floors, is a refuse bed—a typical midden type of deposit formed by the gradual accumulation of vegetable debris, such as thatching for roofs and the debris from long occupancy by man.

(4) The lowest plaza floor is to be associated with a plaza much smaller, as compared with the latest plaza; on it are rectangular platforms presumably the foundations for the earliest structures. Whether these were of wood or of stone, they had been razed to make way for the later plaza expansions.

(5) The six plaza pavings occur directly superimposed the one upon another. From the lack of debris accumulation between these superimposed floors we assume that the period involved in their construction need not have been long. As compared with the Black Dirt accumulation, the period may well have been relatively short.

(6) The period of construction of E-VII-sub corresponds with the laying of the second and third floors of the plaza.

(7) The period of construction of E-VII outer corresponds with the laying of the fourth, fifth and sixth floors.

(8) The erection of Stelae 18 and 19, both dated 98 A. D., and that of Stela 20, dated 235 A. D., loses much positive significance, in that their floor-relations indicate these monuments to have been

erected simultaneously. In other words, the earlier ones must have been removed from their original locations. In the case of Stela 20, dated 235 A. D., we can say with some assurance that it probably marks the latest possible date for the construction of E-VII outer.

The true significance of these excavations, however, lies in the definite development of the first pottery stratification for this area, as worked out by Mrs. Ricketson. And here we are back again on firmer ground. There are three main types:

I. Uaxactun I—an early or “archaic” type. This type is found only in the Black Dirt stratum and is characterized by the following types:

- (a) large ollas of unslipped orange-red ware, design in brown wash, thinly applied.
- (b) small ollas of polished black ware with incised cross-hatchings gen-

erally in diamond and half-diamond designs.

- (c) Round bottomed bowls, some spouted, with horizontal fluting around the neck.
- (d) Flat-bottomed dishes, having everted rims with horizontal, parallel incisal lines.
- (e) figurines—of definitely “archaic” characteristics, which are always modeled, never moulded or cast.

II. Uaxactun II. Middle Period. This corresponds to Holmul III. It is characterized by wide-mouthed dishes, with a basal bevel or flange, in polished black ware or with complicated polychrome designs on the exterior.

III. Uaxactun III. A late period. Corresponds to Holmul V. It is characterized by:

- (1) tripod dishes, with rattle legs;
- (2) shallow plates (some with tripod



FIG. 7. TEMPLE E-VII, UAXACTUN

AT CLOSE OF THE 1927 SEASON. THE TWO MASKS VISIBLE BELONG TO AN UNDERLYING PYRAMID, E-VII-SUB. STELA No. 20, DATED 235 A. D., IS SEEN AT FRONT.

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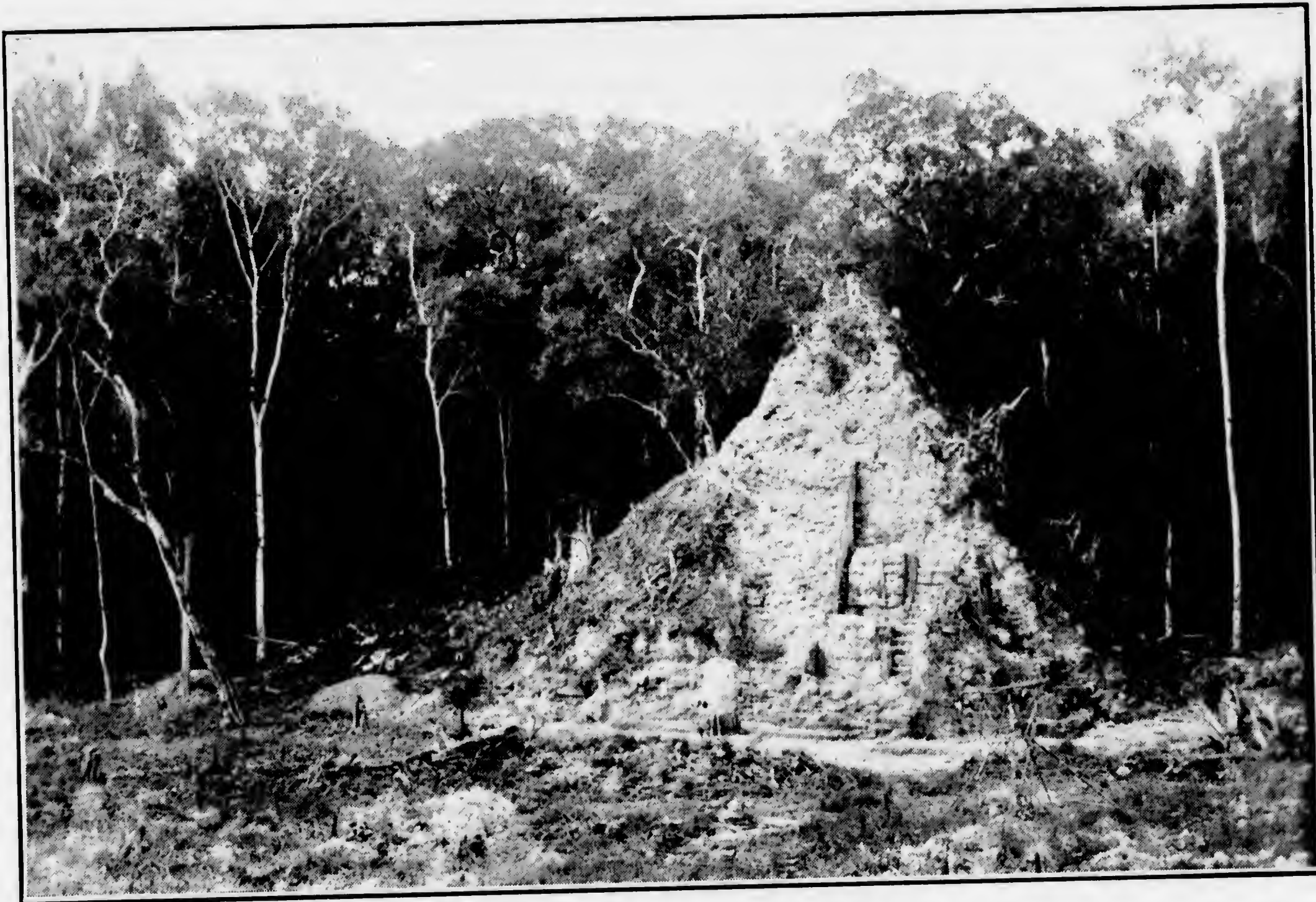


FIG. 7. TEMPLE E-VII, UAXACTUN

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Retake of Preceding Frame

support) with polychrome design on interior;

- (3) cylindrical vases with polychrome design on exterior, consisting of glyph-band and life figures.

This pottery sequence at Uaxactun seems to indicate an early influence from the south, Salvador and Nicaragua, a local development, and a later influence coming from the north or highlands of Guatemala. The nearest relationships for the Uaxactun I figurines are seen in those from the Ulua Valley, though there is also a resemblance, not so close, with the figurines from the Finca Arevalo, Guatemala.

When I mentioned Temple A-I, I said that it was the site of an important pot-

tery cache found by Mr. Robert Smith in 1931. The cache consisted of eleven magnificent polychrome pots from a grave vault (Fig. 6). These are all of Uaxactun III period, that is, polychrome designs often with glyph-bands and life figures. I shall here describe seven of the more important of these vessels.

The first of these vessels is a simple bowl, six inches in diameter, and 3.6 inches deep, of polished orange-red ware with a conventionalized design in red and brown in four bands horizontally around the rim and sides; the second, a similar polychrome bowl, 6 inches in diameter and 6 inches deep, with the addition of black to the colors already mentioned. The third is a polychrome

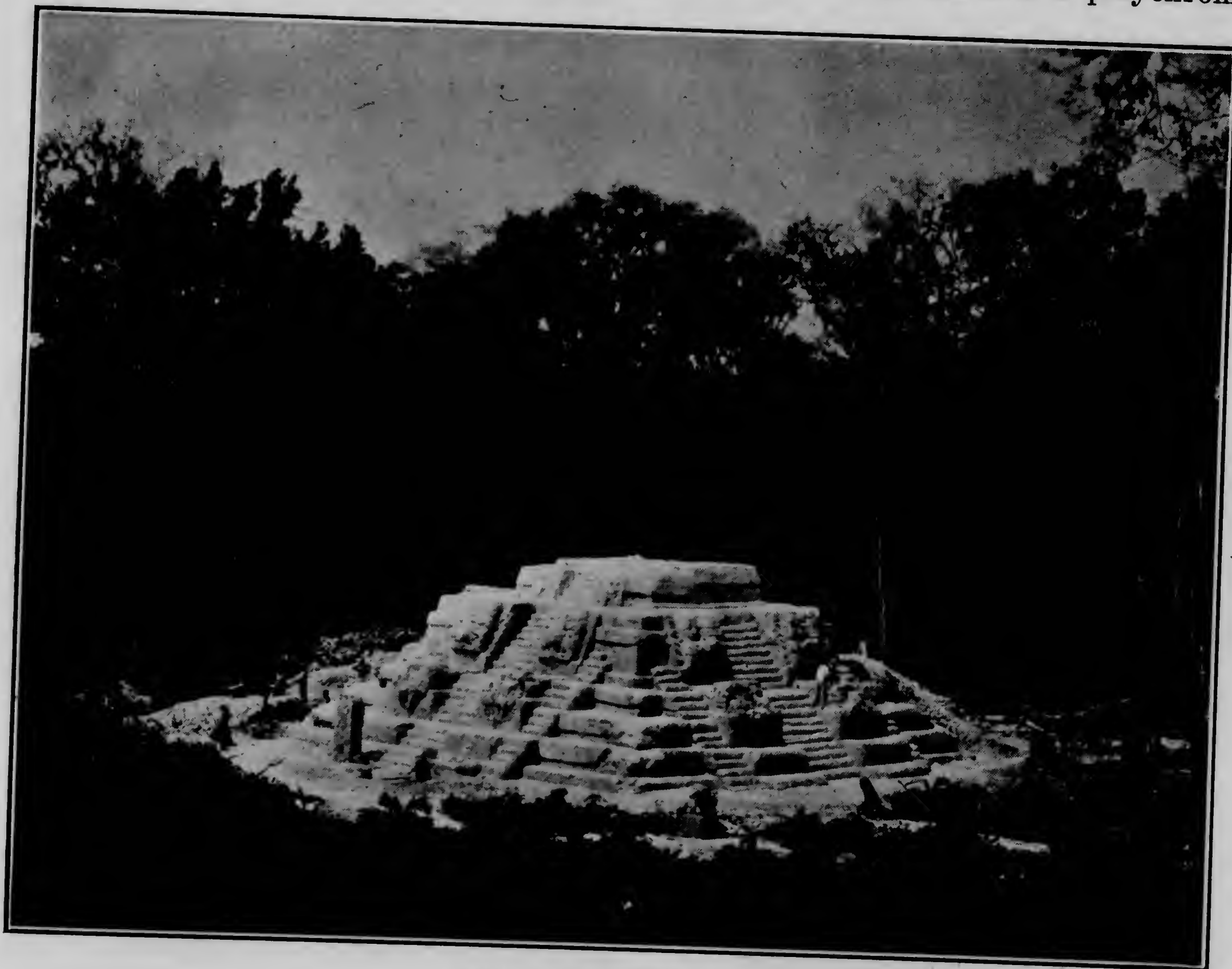


FIG. 8. E-VII-SUB.

THIS PYRAMID WAS BUILT OF UNCUT STONE AND FACED WITH DAZZLING, WHITE STUCCO. FOUR MAIN STAIRWAYS LEAD TO THE TOP. FLANKING THESE ARE COLOSSAL MASKS OF FINE, LIME STUCCO, FASHIONED IN THE LIKENESS OF GROTESQUE HUMAN HEADS. STELA E-20, AT LEFT, BEARS THE DATE OF 235 A. D.



FIG. 9. TRENCHES IN E-PLAZA

AT THE CLOSE OF THE 1929 FIELD SEASON. LATER THESE WERE DUG DOWN THROUGH SIX SUPERIMPOSED PLAZA FLOORS.

bowl, 7.5 inches in diameter and 2.7 inches deep, but with only black and red on the orange background, and with two vertical areas of red instead of the horizontal bands seen on the others.

A fourth vessel from this cache is a shallow bowl with an orange slip on the inside, unslipped and unpainted on the outside, measuring 12.25 inches in diameter and about 3 inches deep. The painted design on the interior consists of a narrow black and a broader red band around the rim, and a central figure in red outlined with black which is not identifiable, though it has some resemblance to the head and forelegs of a turtle emerging from an area of red curlicues.

A fifth vessel is a shallow, flanged tripod dish, 18.2 inches in diameter, unslipped and unpainted exteriorly but bearing on the interior an elaborate design in red and black on a buff background (Fig. 10). The flattened, slightly everted rim (2" wide) is painted solid red for half the circumference; the

other half has black spots, simulating the spots of a jaguar, on buff. Within the rim, the concavity of the plate pitches more steeply for a distance of two inches. It is set off from the rim proper by a heavy black line. This surface is painted solid red for half the circumference; the other half shows five series of hieroglyphs outlined in black but painted red.

Within these two rim areas are two concentric heavy black lines which enclose the main artistic effort . . . a boldly, if carelessly, executed picture, also in black and red, depicting full face on the right a man in regalia with a javelin or staff, looking left. The body of a serpent divides the remaining surface into an upper and a lower portion. In the upper portion, facing left, are four human figures in profile. The first on the right carries a stick; the second holds the tail of a jaguar whose body fills the lower left quadrant of the dish, below the serpent's body. Both of these human figures are standing. The third



FIG. 10. A SHALLOW, FLANGED TRIPOD DISH FROM VAULT II

ITS EXTERIOR IS UNPAINTED; ITS INTERIOR BEARS AN ELABORATE DESIGN IN RED AND BLACK ON A BUFF BACKGROUND.

and fourth figures, however, are kneeling and hold before them in their hands a monkey each.



FIG. 11. A SHALLOW BOWL

14 INCHES IN DIAMETER, ALSO FROM VAULT II. THE FIGURE IS THAT OF A MAN POISED AS THOUGH ENGAGED IN A POSTURING DANCE. THE HOLE THROUGH THE MIDDLE INDICATES THAT IT WAS CEREMONIALLY "KILLED," POSSIBLY TO RELEASE THE SPIRIT OF THE VESSEL TO ACCOMPANY THE SPIRIT OF THE DEPARTED OWNER.

The lower portion of the dish depicts the body of the jaguar already mentioned on the left; another jaguar approaches from behind the large human figure in regalia, which we first mentioned as filling the whole right-hand area. Both jaguars give the impression that they are stalking or even springing at a central human figure, apparently unclad, which is shown in profile and head down between them, in what, for lack of a better word, we may describe as an acrobatic position . . . arm on the ground, head bent back so that the face looks to the left, the body rising in a column above, and the legs flexed at the knee so that the feet hang down.

As already said, the whole has been done with boldness; in spite of its obvious complication, it leaves small areas around the periphery blank; the scene depicted is certainly ceremonial, the full face figure on the right being the master of ceremonies, the "acrobatic figure" perhaps being a corpse thrown to the jaguars. If this figure represented a form of the Diving God, one would expect it to wear insignia. Tricklets of tears from its closed eye would seem to indicate that the individual was either dead or not enjoying the prospect.

A sixth dish, 14 inches in diameter, with tripod legs, also unslipped and unpainted on the exterior, shows a central human figure in red and black on an orange-buff background (Fig. 11). The rim area is demarcated by outer and inner concentric red and black borders, $1\frac{1}{2}$ inches apart, containing between them a series of non-calendric hieroglyphs painted free hand in black.

The human figure represents a man standing erect, full face, toes apart, with a large non-feather headdress and a highly deformed skull. His left arm and shoulder are raised, the palm extending outward, the long fingers pointing down. His right arm, rigid, is held

down slightly away from the body, the hand and fingers bent inwards and upwards. Feet, legs, torso and arms are red; the face, except for the region around the eyes and mouth, which are orange-red, is left the buff color of the background, as are the thighs. These latter give the appearance of being clad in puffy doublets supported by black and red sashes whose half dozen ends swirl out around the legs. Nothing can describe the position of this figure better than to say that it probably depicts some posturing dance at a moment when the arm-action is semaphoric in its rigid-

white slip, and painted outside, the design showing against a red background. Around the rim, beneath a band of red .3 inches wide, is a cream-colored band .9 inches wide bearing hieroglyphic figures outlined in black and painted for the most part red, with some pale orange. Below this band there are represented six figures, five human and one jaguar. The chief figure is represented seated cross-legged on a dais, full face, but with the head facing left. Behind it stands a smaller figure, dressed in black, bearing before him as an offering some object in his hands. Behind this figure stands



FIG. 12. A CYLINDRICAL JAR

9 INCHES HIGH AND NEARLY 6 INCHES IN DIAMETER, FOUND IN VAULT I. THIS PICTURE REPRESENTS IT AS CUT FROM TOP TO BOTTOM AND FLATTENED OUT. THE JAR IS DECORATED WITH A COMPLICATED DESIGN SHOWING AGAINST A RED BACKGROUND. NOTE THE DOUBLE ROW OF DATE GLYPHS AT LEFT OF THE SEATED FIGURE. THIS IS THE FIRST SERIES OF SUCH GLYPHS EVER FOUND ON ANY MEDIUM OTHER THAN STONE OR STUCCO. ACCORDING TO ONE SYSTEM, 120 B. C. IS THE DATE REPRESENTED; ACCORDING TO ANOTHER, 140 A. D. IS INDICATED.

ity. That this piece was ceremonially "killed" is indicated by the hole in the center.

The most interesting vase from this cache, and the last, is a cylindric jar measuring 9 inches in height and nearly 6 inches in diameter (Fig. 12). It is slipped inside and out with a cream-

a third, larger one, bearing a ceremonial staff, which he holds over the heads of the other two; the staff carries a panache of feather work at the extremity and was intended perhaps for shade as well as for regalia of office. These three figures all face left; they are unfortunately in a poor state of preservation,

the slip having peeled off, perhaps because this side was nearest the burial itself.

Facing them stand the other two figures, and the jaguar, sitting; but between the foremost of these figures and the chief seated figure we have already described is a double row of calendric hieroglyphs, eight in a column, or sixteen altogether. The first of the figures facing the seated figure is a man standing, with an elaborate feather headdress and a fringed apron-like garment extending from his neck to below his knees. His right forearm extends through this apron and he holds in his hand a small, tridentate object, the points down, resembling an eccentric flint. His skin is represented as painted black on the arm, legs and face, except for an area around the mouth, which is left cream. Behind him, as though attached at a point just below the shoulders, is a cruciform design representing a feathered serpent, whose head and jaws face left. Beneath and behind him the sitting jaguar is represented holding in his outstretched right paw two flaring rimmed dishes, the one inverted over the other, and tied together with a band.

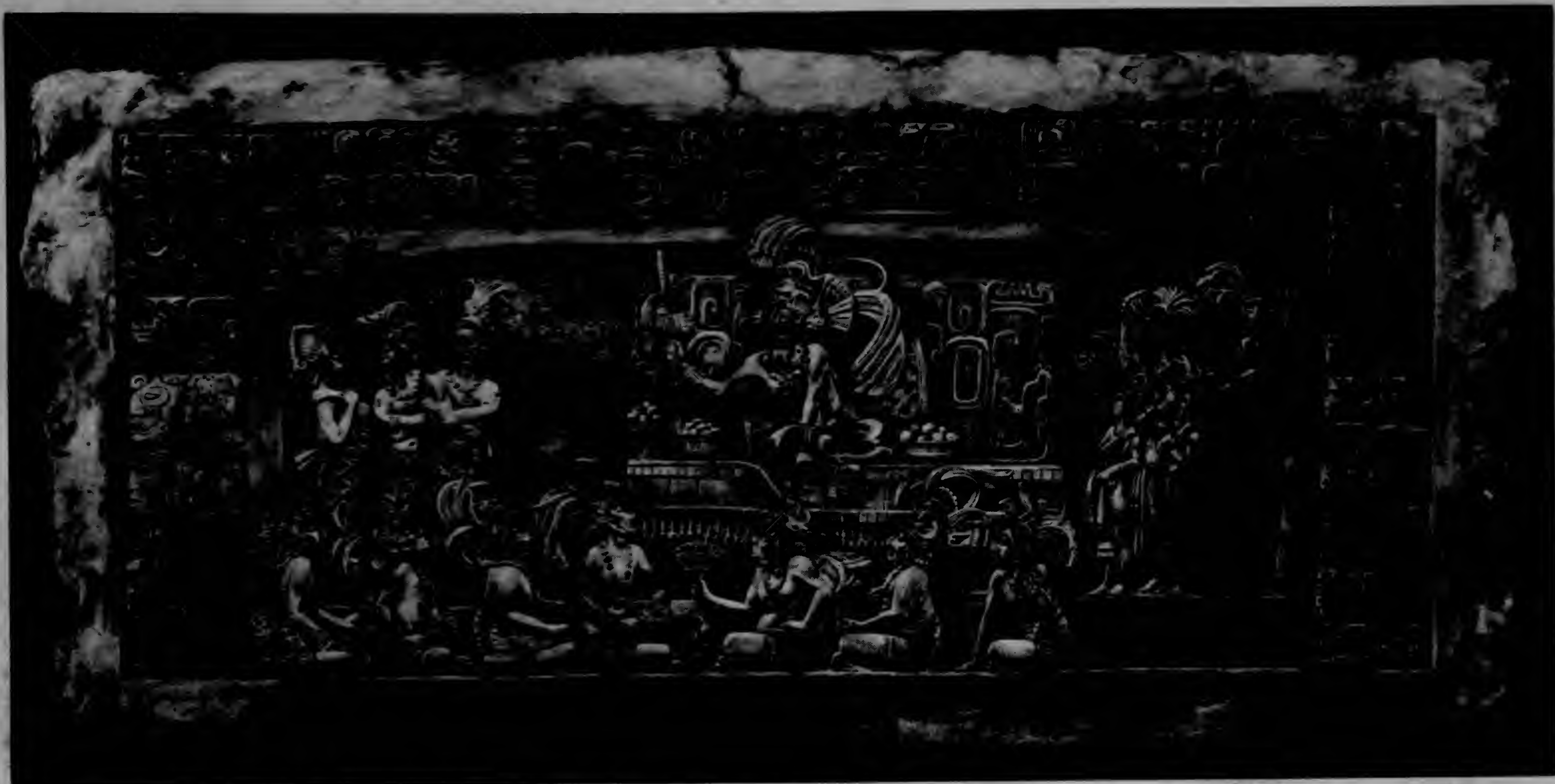
The last figure is similar to the one last described, the essential difference being that he holds upright a plain staff in his right hand. His headdress involves a jaguar head as well as featherwork, and a less elaborate, conventionalized feathered serpent is shown behind him also, as though attached to the small of the back. All these figures stand on a narrow cream-colored band just above the bottom of the vase. Four series of non-calendric hieroglyphs are shown in juxtaposition to the various figures.

The calendric hieroglyphs, reading from left to right and from top to bot-

tom, give us the date 7. 5. 0. 0. 0. 8 Ahau 13 Kankin. Unfortunately, this seventh cycle date can not be contemporaneous, because the vase belongs stylistically to the latest period at Uaxactun. We might infer then that the date referred back to some past event in history wherein two ambassadors appeared before a king or noble. But unfortunately the fifth katun of the seventh cycle does not fall on 8 Ahau 13 Kankin, so that it is quite evident that the potter himself made a mistake when he put on this Initial Series.

Maya hieroglyphs and their systems of bar and dot numeration being what they are, several solutions have been offered in an effort to determine the date that was actually meant. Dr. S. G. Morley adds one dot to the cycle, making it read 8. 5. 0. 0. 0; this falls on 12 Ahau 13 Kankin, so that the only other correction necessary is to change the one bar and three dots of the day-sign Ahau to two bars and two dots. This system has the merit of merely changing the numerations and not the glyphs, but on the whole it is very difficult for us, almost two thousand years later, to decide just exactly what date was meant, and, in this case anyway, the importance is not so great, inasmuch as the contemporaneity of the manufacture of the pot and the date 7. 5. 0. 0. 0 is out of the question.

The description of this cache concludes my remarks on the excavations carried out during the past six years at Uaxactun. I hope that the future excavations, which will be under the direct charge of Mr. Ledyard Smith, will uncover other caches of equal beauty and importance; perhaps it is one of the fascinations of archeology that nobody can predict what the removal of the next spadeful may reveal.



ARCHAEOLOGY

Humor in Indians' Carving Is "Delightful Surprise"

A MASTERPIECE of ancient American art portrayed with a sense of humor!

This discovery from ruins of a Mayan Indian city in Guatemala is intriguing archaeologists, who call it a "delightful surprise."

It appears that America's most highly civilized Indians, the Mayas, were not afraid to satirize themselves and their leaders as they looked in public meetings. Sculptors and painters usually pretend that important occasions go off smoothly, with everybody on his dignity. This Indian sculptor knew otherwise, and dared to play lightly with such a scene, even though his stone art was to adorn the doorway of a lovely and dignified temple.

As a result, modern America can see for itself what it might have suspected, that American audiences over a thousand years ago included the whisperers, the man who pokes the fellow in front, the speaker who mumbles and turns his head. They are all there, portrayed by an unknown sculptor in a scene that some critics have pronounced the finest known specimen of Mayan art in stone.

When the stone lintel was discovered at the ruins of Piedras Negras by an expedition of the University Museum of

the University of Pennsylvania, the carving was badly worn and damaged, but its beauty and importance were evident. Six dates on the lintel in Mayan hieroglyphics were read by Dr. J. Alden Mason of the expedition, and none was later than Dec. 2, 757 A.D.

Now, an attempt to reconstruct the sculpture has been made, by extending in a drawing the broken-off lines of human figures to show what the Indian group was doing in the picture. Marred as it is, the scene retains many cues to poses and costumes that an expert eye can visualize in their original complete state.

Miss M. Louise Baker, an artist with long experience in archaeological art, was asked to work out the problem.

Presenting her drawing, now finished, in the museum's bulletin, Miss Baker vividly points out amusing touches in the Indian's work.

"Two of the trio," she writes, referring first to the left hand group, "forgetful of the occasion, are entirely absorbed in their own argument, while the third, indignantly bracing himself upon outspread feet, gives a vicious bump with his hip (breaking his own obsequious pose for the moment), demanding attention.

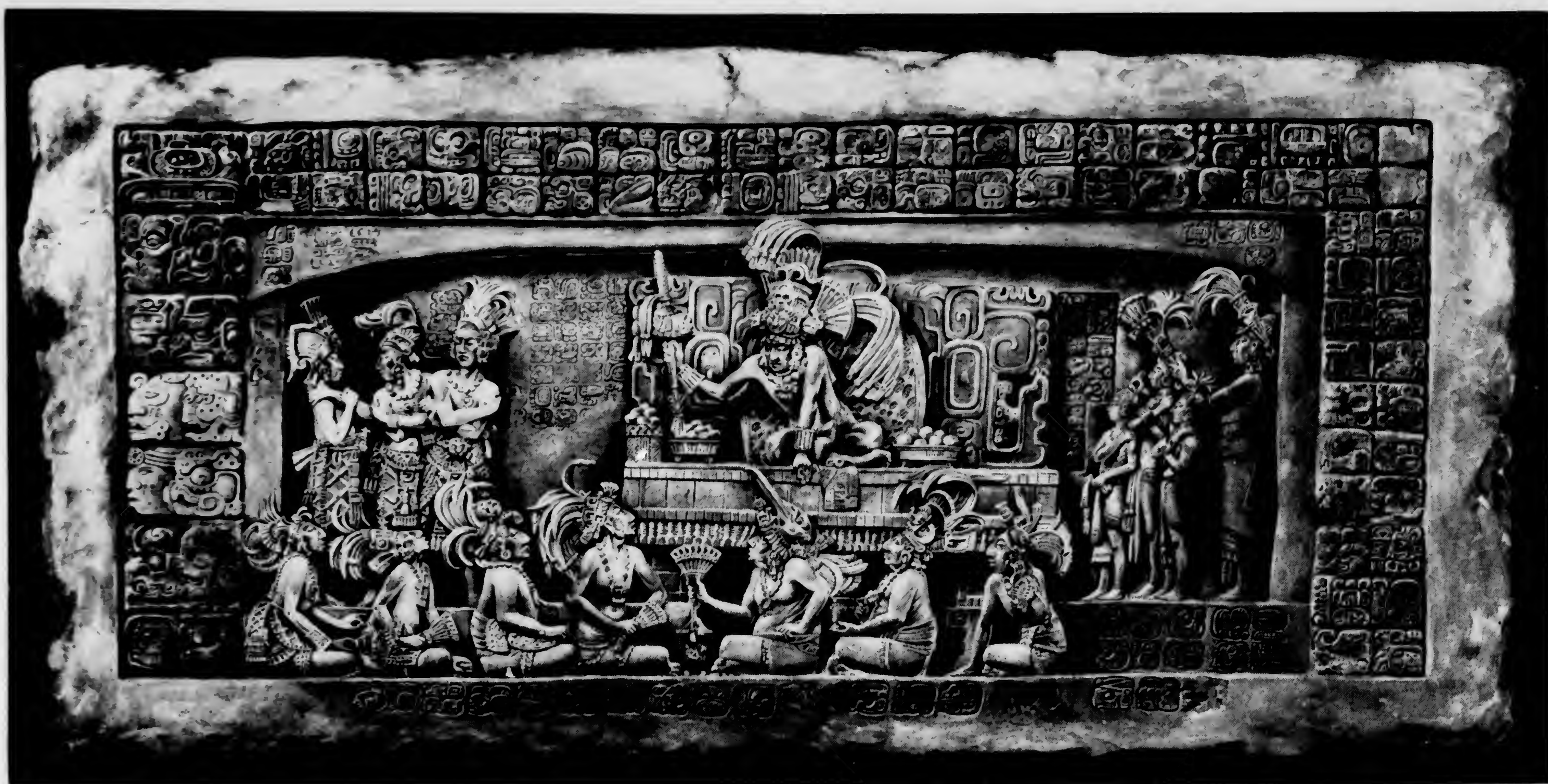
MAYAN HUMOR

Although intended for use over the door of a temple, this stone carving pokes fun at public audiences, not so different then from those listening to political speeches this fall. Standing at the left are the inevitable whisperers engrossed in their own argument and the man who reproves them with a nudge of the hip for attention. Seated at the left is the man who pokes his neighbor with a request for information. The neighbor cranes his neck to see over the feather headgear ahead. The deaf man who pulls his ear out to hear better is seated at the right. Notice the toying with beads and tassel.

"The seated figures are very human in manner and detail. The left dignitary gently pokes the friend in front to ask what it is all about. The friend, willing to accommodate, vainly tries to peer over the intervening mass of feathers, bracing himself on his foot, in his effort to see—a taut neckline giving the cue.

"The next man complacently toys with his tassel, his sleek round body oozing contentment. The fourth in line is a lean, capable young man, to whom the chief is evidently directing his words and attention. The fifth, the patriarch of the row, has slumped in the shadow of his master, his fan arrested in mid-air. The sixth, holding his vase upon his knee, absent-mindedly fingers his beads.

"The last man, and the only one whose face was not completely destroyed, has lost interest after a fruitless attempt to hear and his hand has probably dropped from cupping his ear to toying with his ear-plug. (Turn page.)



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Retake of Preceding Frame

"The group on the right was the most difficult. An attachment for a foot was finally discovered, proving that four figures instead of three were filling the niche. The comparative height of knees gave evidence that two boys, a youth, and a grown attendant comprised the party. Anatomically, it is impossible to group them otherwise."

The lintel is of buff-colored limestone, 24 by 49 inches. The poses of the figures, which have been called by Dr. Mason "Greek in quality," are praised by Miss Baker. The clothing, and the objects held by the Indians, are so exquisitely shown in details that they add to modern knowledge of the ancient Mayan civilization. Even the fingernails on the hand of the chief are perfectly shown in the original, which Miss Baker declares "must be seen to be appreciated."

Science News Letter, August 22, 1936

The artillery plant is so called because of its trick of shooting its seed.

METEOROLOGY

Flights to Study Adverse Polar Weather Conditions

SYSTEMATICALLY and with painstaking care, Soviet scientists and engineers are tapping the secrets of the frozen Arctic to learn what pitfalls await plans to establish aerial transportation through its far-flung Siberian terrain, its Pacific borders and eventually to reach North America.

The 10,000 mile flight from San Francisco to Moscow via the polar route which was recently started from the United States by the two Soviet airmen, S. Levanevsky and Victor Levchenko, is no mere stunt flight as were some of the trans-Atlantic crossings in the post-Lindbergh era.

With instructions from the Moscow home office, the Soviet pilots frankly

are seeking the "worst" weather the Arctic can offer. If they arrive home safely, the U.S.S.R. will have highly valuable first hand data on the possibilities of Arctic flight.

What few people outside of professional navigators seldom realize is that the shortest route between Moscow and Chicago, for example, is across Polar regions. The Moscow-San Francisco trip would be shortest by going directly over the North Pole.

Although it has yet received little mention, other Soviet aviators unofficially broke, late last month, the world's long-distance airplane record with a non-stop flight of 5,825 miles. Remaining aloft nearly 56 and one-half hours, pilots V. P. Chkalov, G. F. Baydukov and navigator A. V. Belyakov took their heavily-laden, single-motored ANT-25 plane under adverse weather conditions from Moscow to the tiny island of Udd on the Siberia Coast just west of Nikol-aevsk-on-Amur.

Deliberately they flew out over the Barentz Sea and the Arctic Ocean for more than half of the flight.

While the distance covered exceeds the record of 5,657 miles made by the French aviators M. Rossi and P. Codos in 1933, it cannot be entered as official because it was not in a straight line. Take-off and landing points alone are considered in the records. But, after all, the Soviet pilots were seeking knowledge of Arctic conditions, which is more important than records.

Science News Letter, August 22, 1936

A new variety of wheat known as Number 19 has been developed at Cornell University's experiment station, and is pronounced high in yield and very satisfactory in baking tests.

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Remembering this, we feel that you may have friends who would like to know about Science News Letter. Send us their names and addresses and we will gladly send to each a free copy.

SCIENCE NEWS LETTER

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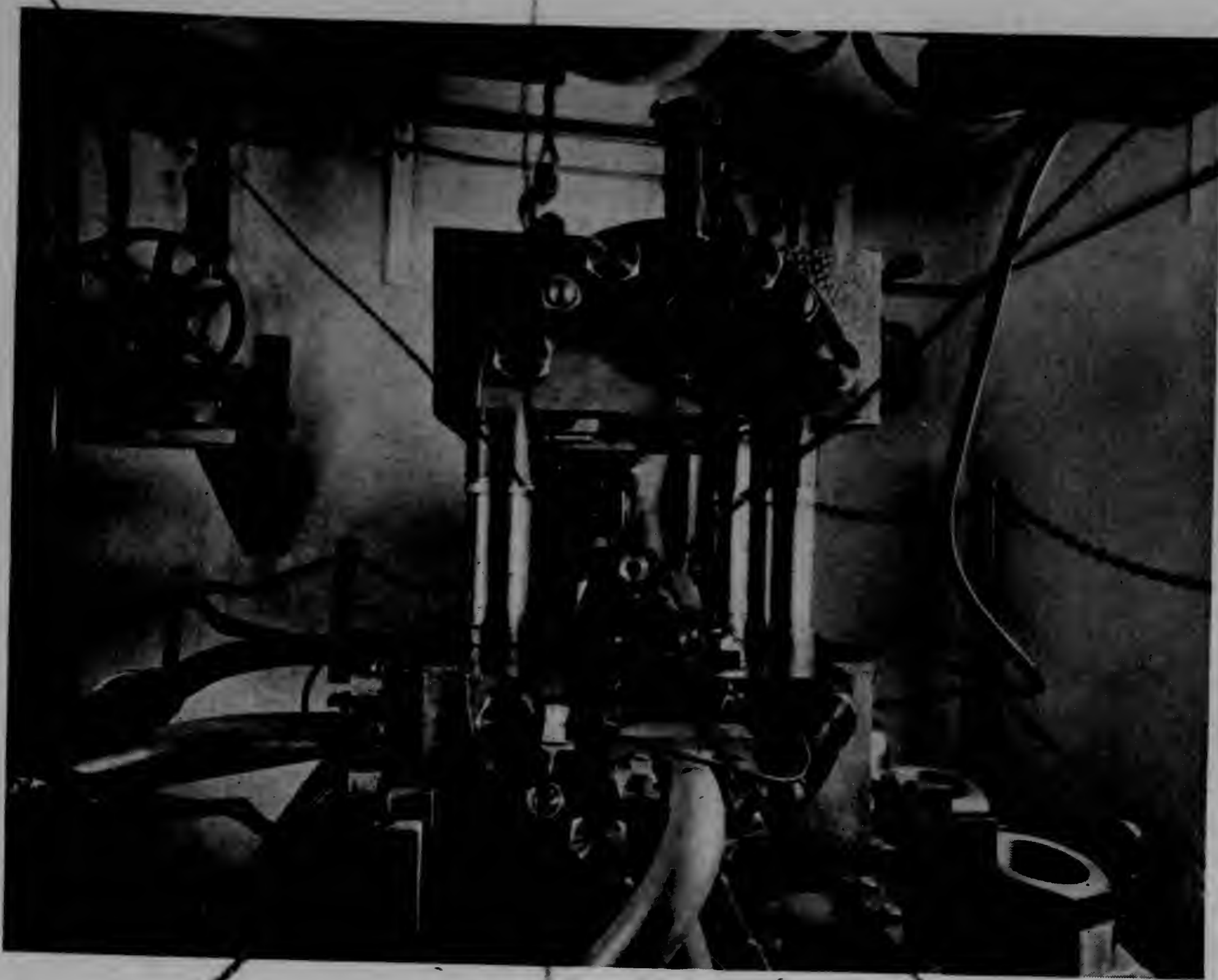
August 25, 2:15 p.m., E.S.T.

CHILDREN WITH NERVES—Dr. Knight Dunlap of the University of California.

September 1, 2:15 p.m., E.S.T.

SCIENCE IN HARVARD'S TERCEN-TENARY—Watson Davis, Director of Science Service.

In the Science Service series of radio programs over the Columbia Broadcasting System.



ULTRACENTRIFUGE

This apparatus, which whirls solutions with forces equal to 250,000 times the force of gravity, is now in use industrially by the du Pont company. For the photograph, the upper part of the housing has been removed to show the rotor, cell chamber and end of bearing.

ARCHAEOLOGY

Spotlight Focusing on Mayas; Great Discoveries Expected

THE SPOTLIGHT of discovery is focusing on the land of the Mayas. It looks as though news of ancient America's greatest civilization would break there soon.

An expedition is already digging in the very region where the most learned students of America's past have pointed, as the likely birthplace of the magnificent Mayan civilization. And that is in the highlands of Guatemala, south of Mexico.

Expeditions heretofore have unearthed ruined cities of the Mayas in jungles of Yucatan and Guatemala. They have revealed these ancient Indians as master builders, astronomers, mathematicians, and inventors of a writing system. Belated respect is paid the Mayan calendar. It was more accurate than the calendar of Spain, when the Spaniards arrived in America and set about civilizing the benighted savages.

But what has baffled science is to explain when and where so extraordinary a civilization got its start.

So, the expedition of the Carnegie Institution of Washington, which has launched on a campaign to explore mounds in the highland region, in the suburbs of Guatemala City, is being closely watched.

It was in the hill country, by the generally accepted theory, that the Mayas or their forefathers learned to plant corn. And when they became stable farmers, then their star rose and they began to build massive temples to the gods and to practice the arts and sciences.

At the site chosen for digging, discoveries have already been reported by Dr. A. V. Kidder, expedition leader. A stucco pyramid, three times rebuilt, and tombs containing pottery of great interest, are the initial finds. How old will the site turn out to be?

Potsherds found at the same site some years ago were hesitantly pronounced "early." Since then, archaeologists have accumulated more knowledge for establishing the antiquity of Mayan remains, as far back as the history has been pushed. The oldest known Mayan city, Uaxactun, goes back to several centuries before Christ.

Before the present expedition began its work, Dr. Kidder summed up the strategic importance of the highland impressively in these words:

"The significance of the Guatemala highlands can hardly be overestimated, for in the mountain valleys should be found the remains of the early groups whose culture, according to the hypothesis held by most authorities, either through movement of people or by diffusion, fathered that of the Maya."

Science News Letter, April 11, 1936

PHYSICS

Powerful Ultracentrifuge Is Built Commercially

NEW RESEARCH equipment which whirls solutions with such velocities that the centrifugal forces developed are equivalent to 250,000 times the force of gravity has just been installed at the du Pont Experimental Station, Wilmington, Delaware.

The apparatus, known as an ultracentrifuge, works on the same principle as the old-fashioned cream separator. High speeds of revolution, however, make the device capable of creating forces so powerful that molecules and sub-microscopic particles can be separated out of their solutions.

The high-speed rotor of the ultracentrifuge is revolved by a turbine driven by a blast of oil. At the normal operating speed of 60,000 revolutions a minute the tip of the rotor is moving with a velocity of 1,200 miles an hour; this is one and one-half times the muzzle velocity of a 22-caliber rifle bullet.

The device is a commercial adaptation of the apparatus first developed by the Swedish scientist, Prof. Thé Svedberg who won the Nobel Prize in Chemistry in 1926.

Prof. Svedberg has been able, in his laboratory models of the ultracentrifuge, to obtain rotor speeds of 160,000 revolutions a minute and create forces equivalent to 1,100,000 times that of gravity. (SNL, Aug. 4, 1934)

In America at the University of Virginia, Prof. J. W. Beams and his co-

PRE-MAYA EXPLORATIONS IN GUATEMALA

THE forerunners of the wonderful Maya civilization in Central America have been discovered. Earthquakes which long ago shook Guatemala may enable archeologists to shove American pre-history back many thousands of years, and thus a new era ripe for archeological research will be revealed.

Such are the probable results of a three months' reconnaissance survey of unknown Guatemala just completed by Dr. Manuel Gamio, leading Mexican archeologist, working under the auspices of the Archeological Society of Washington. Dr. Gamio is now on his way to Washington, where he will study the material he has collected and will prepare a scientific report of his exploration trip.

The survey was for the purpose of determining whether Guatemala is a promising field for pre-Maya explorations. The first reports confirm the conjecture that the Guatemala highlands would yield evidence of ancient human occupancy, dating back to long before the time of Christ.

What happened in the central region of America before the rise of the Maya, the Toltecs and the Aztecs is literally "pre-history." From time to time clay and stone fragments of great antiquity have been found in Central America, but archeologists have vaguely termed them as "Archaic" which means only that they belong to an age and a people that distinctly preceded the Maya.

In a report to the Washington Society, Dr. Gamio states that he has made several trial excavations, digging through seven strata of deposited soil, each layer being about twenty inches thick. In these deposits he found numerous fragments of pottery and clay sculptures. Many of these are of the Archaic type. There are a few Maya finds. Also, some of the pottery shows signs of a gradual transition to the ceramic style of the Maya, indicating that the two types may have blended or that one developed into the other.

Geography and earthquakes in particular are helping in this tracing of early Mayan history. Exploring this unsettled region, Dr. Gamio has found evidence that "the Maya, able constructors of lofty and complicated edifices, did not, if one may judge from appearances, build anything in the high zones affected by earthquakes. They confined themselves to the lower and above all to the coastal regions, where shocks were not experienced."

Buildings of the Maya remain standing in Guatemala to-day. Dr. Gamio suggests that probably these careful builders profited by the earthquake experiences of the earlier and more primitive people, because the makers of the Archaic pottery had established their settlements with careless disregard of earthquake zones.

It is not yet determined, however, whether these early inhabitants built such simple homes that they did not fear the rocking of houses and the falling of walls, or whether there were fewer earthquakes in that part of the world then.

The part played by earthquakes in the wanderings of these prehistoric American tribes is being closely studied by Dr. Gamio, who says that earthquakes have had a marked influence on the development of human life.

Central America

Panama

C. Hart Merriam
Papers
BANC MSS
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62. RELIGION AND PICTURE WRITING OF THE
CUNA INDIANS

ERLAND NORDENSKIÖLD

The lecturer will give an account of the Cuna Indians' religion and of their picture-script.

The Cunas believe that they possess a particular god of their own, that man has a soul, and that the world is full of demons, but also in the existence of benevolent spirits. They further believe in a nether world where the good are rewarded and sinners are punished. In this nether world there are many custodians, certain of whom,—as for example those that cause the rain to fall,—intervene in the affairs of mankind here upon earth. There is a celestial ship in which the sun sails his course, and another such ship for the moon. The earth, according to their belief, is built up of eight strata. All this is of to-day, and of living actuality. They also tell legends of cultural heroes. These personages, however, only possess an historical interest, their various tasks having long been carried to completion. There are also myths of the creation of the world, and the like.

When the lecturer, in 1927, visited these Indians he discovered among them a number of documents in which they themselves had recorded many of their songs as well as the beliefs and conceptions partly in letters of our alphabet. The lecturer is of the opinion that this picture-script is of ancient American origin and that he is able to adduce proofs in support of his theory. Writings of this kind are mentioned as early as the 16th century from Darien and adjoining regions by several authors.

Golden Relics of An Ancient American People

FOUR or five years ago several poor and ignorant natives were poling their way in a canoe up the Rio Grande de Coclé, a large river in western Panama about ninety miles south of the Panama Canal. The dry season had lowered the river. As the small craft made its way upstream, the keen eyes of one of the natives noted something glittering in the bank.

In a few minutes greedy hands were tearing at the soil, for they had found pieces of gold. The fact that the gold articles were objects of art beaten into curious and beautiful shapes by hands long dead, did not interest the natives. But it did interest scientists. When word of the find came to the Peabody Museum of Harvard University a party of archæologists went down to investigate. The scientists worked in secret for three years, and have now returned with a store of gold objects worth a king's ransom. In the opinion of Dr. S. K. Lothrop, leader of the expedition, they represent the art of a civilization in Panama that has hitherto been unknown to science.

The chance which brought scientists to the spot was due to a shift in the bed of the Rio Grande de Coclé. In changing its course the stream cut through an ancient burying place. The gold ornaments which excited the interest of the natives were part of the funeral dress of some long-forgotten chieftain, buried not only with his richest possessions of metal and pottery, but surrounded also by his wives, retainers, servants and slaves.

The abundance of similar finds made by the Peabody Museum party in its three-year sojourn in Panama was almost without precedent. Describing the results of the expedition recently in the *New York Times Magazine*, Dr. Lothrop reported that from

ing thousands of beads, four large and heavily embossed golden discs, twenty-eight discs about three inches wide which had once been sewn on a shirt, four pairs of gold cuffs and twenty-four rods of gold with decorated tips, for insertion in the ears.

There were 225 pottery vessels, both for domestic service and for religious offerings. There were fifty-seven stone axes and chisels, five gold chisels, twenty-one stone knives, 100 stone arrow points, nine mirrors of hematite set in limestone discs, pendants and beads of agate, statuettes carved from the ribs of the manatee or sea cow, some of them overlaid with gold; wild boars' tusks set in gold, sting-ray spines and saw-fish teeth used as spear points, sharks' tooth necklaces, crystals, gilded copper ornaments and many other objects.

"Such a list gives but a pale picture of the reality," said Dr. Lothrop. "Gold does not tarnish in the earth and it appeared gleaming in the sun as our knives and brushes removed the accumulated layers of dirt. Intricate designs beaten in high relief met the eye; huge breastplates embossed with mythological monsters; gold cuffs running in sheets from wrist to elbow, each pair stamped with a distinctive design or property mark (corresponding to our coat of arms); complex castings of strange anthropomorphic gods fashioned in molds over delicate models in wax.

The richness, variety and fine workmanship of these possessions indicate that a well-established, wealthy and highly organized culture produced them. Dr. Lothrop and his associates believe, from a study of

the relics, that the Panama peoples were unrelated in culture either to their neighbors the Mayas and Aztecs to the northwest, or the Incas to the south. In short, the discovery of these graves has brought to light remains of a hitherto unknown American civilization, as great and important in its way, perhaps, as any of the others.



Gold pendants representing alligators, dogs and other animals

Who were these people? Histories relate that a party of Spaniards in search of gold left the coast of Panama in 1515. Moving inland, they came to a district ruled by a powerful chief named Parita, who by a stratagem administered such a crushing defeat to the Spaniards that they were driven off.

Several years later a band of Spaniards searching for him found his body elaborately decked for burial, surrounded by bound captives who were to accompany him to his grave. His body was adorned from head to foot with golden ornaments and many others were in baskets nearby. Stripping the body and robbing the baskets, the Spaniards returned to the coast with more than 300 pounds of gold.

Parita and his subjects were probably remnants of the once-great civilization which produced the ornaments and relics recently uncovered by the archæologists.



Gold breast ornament more than eleven inches wide, part of the Panama find

one grave alone, measuring no more than twelve by fourteen feet, more than 2,000 objects were removed.

The grave contained a score of bodies, laid out in rows upon massive stone slabs. Piled over and around the bones were ninety-six different objects of gold, including four heavy pendants, set with semiprecious stones, six gold necklaces contain-

A Machine to Aid Building of Underground Structures

Will cities of the future, instead of soaring into the sky, go down into the earth to seek the several advantages of building in solid rock? No one can say at this stage of human development what the future may bring, but if mankind does decide to build down instead of up, a machine recently designed by Prof. Philip B. Bucky, of Columbia University, will make it easier for him to do so.

Large underground rooms are now dangerous—in many instances impossible—because no engineering device has been available for testing the kind of structures needed to support the tremendous weight of the overlying earth. Professor Bucky's machine, known as a "centrifuge" and intended primarily for safety work in mines, provides a quick, inexpensive and accurate way of testing underground structures in

advance. It thus paves the way, in the Columbia professor's opinion, for the construction of underground buildings and chambers of unprecedented size.

A model made of the same materials and in the same proportions as the structure to be tested, is placed on the centrifuge and whirled at such speed that centrifugal force tends to crush it in the same way that the weight of overlying earth would act upon a real structure underground. If the structure survives the test, the engineer may be assured that his designs are adequate for underground construction. If weakness appears, the plans can be changed to provide for extra strength at points of frailty.

The centrifuge is the result of a cooperative investigation carried on by the Engineering Foundation and the Columbia School of Engineering.

but his philosophy will save him the retribution of his misdeeds; for he will know not to concern himself with the color of the electron unless the matter has a bearing. He will be apt to reap only the wheat from his harvest and leave the tares.

W. F. G. SWANN

YALE UNIVERSITY

THE WHITE INDIANS OF THE SAN BLAS AND DARIEN

As a result of recent studies carried on in the Darien region of Panama, more specifically on the San Blas coast, certain facts concerning the reported White Indians have been brought to light.

The White Indians obviously express a form of albinism which has been termed imperfect or partial albinism by Geoffroy Saint Hilaire, Pearson and others. These terms signify that either the skin, hair or eyes, any two or all three may fail to express the full albinotic condition, but that one or more are, partially at least, relatively free from pigment.

Such a condition actually applies to the Indians in question. Many, if not all, of the White Indian males have frecklelike copper colored pigment spots of varying size, location and number, which evince an imperfect condition of albinism in the skin. Again the hair is not necessarily devoid of pigment, but in some cases shows traces of brown and in other cases is clearly auburn. Finally the iris is hazel (blue with brown spots), or dark blue, or dark violet. These observations clearly establish the fact that, if any classification of different degrees of albinism is valuable, as no doubt it is, the White Indians of Darien and the San Blas must be considered imperfect or partial albinos.

This contention, as opposed to the classification of these Indians as persons exhibiting idiopathic leucoderma, is supported by the fact that the condition obviously has a genetic basis, and that it is not the result of progressive development but is apparent at birth. Indeed its hereditary nature is demonstrated clearly in the hundred or more matings, the history of which I obtained during my residence in San Blas. If idiopathic leucoderma be considered as an inherited trait, then the terms imperfect and partial albinism and idiopathic leucoderma obviously approach a synonymous significance.

The origin of the condition expressed in the White Indians would seem to be most satisfactorily placed in the mutation theory. I saw no evidence of their origin being traceable to previous miscegenation with Caucasians.

The White Indians appear frequently from matings of brown San Blas Indians, resident on the islands

just off the mainland, and on the mainland itself. Indeed this is the principal source of White Indians in the region, as whites are not permitted to mate with whites, and browns only very rarely mate with whites.

Do the White Indians form a race? If for the existence of a race one demands geographical segregation and permanency through the demonstrated production of likes by likes the White Indians can not be said to form a race, for they neither occur by themselves in segregated geographical areas nor are they permitted to reproduce their kind. But if in a definition of race one includes any group exhibiting strikingly differential characteristics which are insured of permanency by virtue of possessing a genetical basis, then the White Indians of the San Blas may be said to form at present a race which, due to artificial restrictions, is dependent for its continued appearance upon another race, carrying factors for the former's inherited differential characteristics in its germplasm. It is obvious that whatever definition is applied the difference is not qualitative but rather quantitative; the qualitative basis, genetical nature of differential characteristics, being present in either case. Whether or not it is admitted that the White Indians now form a distinct race there can be no question that, at least, they hold potentialities for race production.

Actually, it may be repeated, the whites do not occur by themselves in a segregated geographical area but are to be found in varying numbers in practically all the "brown" villages of the region, where they appear, from time to time, from matings of recessive carrying browns with recessive carrying browns. The whites form about 0.7 per cent. of the total population: an exceedingly high proportion for any form of albinism. This high proportion I attribute to the fact that intense inbreeding has occurred for some time in the Indian villages. Thus conditions are highly favorable for the frequent expression of any recessive traits occurring in the strain. Since all known forms of albinism are apparently recessive to the normal condition, and as albinism, like all recessive traits, occurs more frequently in consanguineous marriages than in the population at large, the observed high proportion of whites among the San Blas Indians is not astounding, in view of the constant inbreeding which occurs.

The exact method of inheritance functioning in the present instance is not yet established. The condition is apparently recessive to the normal, but it is not clear whether it is due primarily to the action of a single gene, in its interrelation to the whole chromosomal content, or whether the genetic composition

[over

of the whites differs in more than one gene from that of the normal San Blas Indians.

A more detailed presentation of the observations made and the data collected will be made in the near future.

REGINALD G. HARRIS

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~~cult and could readily be written down. Such a description as a complete statement would, however, be regarded as artificial without an interlocking mechanism built up in accordance with the ideas which we have inherited from our studies of matter in bulk.~~

It is only little by little that we will allow these modes of expression to depart from us. Each step must be allowed time to grow; and not until it is firmly entrenched are we willing to admit a further extension. Classical electrodynamics itself affords a good illustration of a stage in such developments. I suppose it would be fair to say that, to-day, the average physicist would be very content if everything could be correlated on the basis of classical electrodynamics. Yet, at the time when it was born, electrodynamics was as incomprehensible to most people as the quantum theory is to-day. The desire to interpret it in terms of the properties of ordinary matter was compelling, and afforded difficulties of primary moment. To-day we would be satisfied with the theory itself if it were complete, and would be glad of it not because we have any more of a picture in the sense in which Maxwell or Kelvin looked for a picture, but because we have developed a state of mind in which we have widened our criteria for reasonableness, the change having come about through continual contact with the phenomena correlated by that theory which was at first incomprehensible. It is only by close familiarity with the phenomena that radical changes in physical assumptions, which they suggest, and the corresponding moulding of our thoughts become part of our make-up in the sense that when something is explained in terms of them we say we understand the matter. This development of mental attitude takes place naturally with greatest intensity in the minds of those radicals in physical thought who are responsible for the new points of view, so that it is quite natural to find, as we do find, that radicals in physics are apt to become extremely conservative in their own radicalism.

It is a point which has been mooted before that there may be many ways of understanding the universe in terms of different fundamental starting points; and, once one has become imbued with this view, he is not averse to adopting different methods for the discussion of different classes of phenomena; for it is not unnatural to find that correlation in a

limited field of nature's laws may be made in terms which are simpler than those which would aim to correlate all the phenomena of the universe. I sometimes picture the state of business of an optician whose activity is devoted to the manufacture of lenses, but, hearing of the unsatisfactory state of the quantum theory of dispersion, shuts up his shop until the matter is settled or even attempts to use the theory when it is settled.

How frequently somebody puts forth a theory founded on concepts which seem to have no place in a complete logical scheme, which even imply a misunderstanding of the fundamentals and which the philosopher could knock into a cocked hat in a minute if he so chose. How frequently he uses these concepts in a manner which tempts the mathematical physicist to tell him that he does not know what he is doing. Yet, how aggravatingly frequently he deduces from the illogical mess some new consequence which is found to be right and which may even have no place in the more profound philosopher's scheme of things. There is something in the fact that if we write down any correlation of a group of n phenomena where n is large, the chances are that, no matter what we may be thinking about, or what our picture of the processes is, if that scheme of correlation predicts a new phenomenon, that phenomenon will be found in nature. Even in its full generality, the scheme of nature's laws is not so elusive and fickle but that if we fit some scheme of regularity to it at one place we may, with reasonable chances of success, extrapolate that scheme of regularity beyond the place where we made the fit and predict new results. And it would seem that there need be no fundamental objection to the process, provided that one does not trouble himself about non-essentials—provided that if he uses an electron with mass, energy and so forth he does not wonder what its color is—provided that, if he uses an ether for the purpose of visualizing the propagation of effects in terms of elasticity and inertia, he does not trouble himself as to why it does not freeze out in space where it is so cold, and why he does not therefore get light reflected from the boundary, and why the ether does not boil as the stars pass through it.

A power of critical insight which will enable us to show that, in the last analysis, nothing is real and most things are meaningless is all very well in its way; but it will not always carry its owner very far, and may frequently lead him into pessimism. Perhaps the most hopeful condition is a combination of critical insight with a none too delicate conscience when smelling out the truth. The owner of this combination may be subject to the criticism of being a particularly vicious sinner since he knows better,

THE WHITE INDIANS OF DARIEN

A RACE within a race. In the White Indians of Darien, famous as a part of San Blas tribes that are resisting Panamanian oppression and rule, there lies the potentialities of a new white race.

Such is the conclusion of Dr. Reginald G. Harris, director of the Biological Laboratory of Cold Spring Harbor, Long Island, N. Y., who last year, with the assistance of Mrs. Harris and R. O. Marsh, the civil engineer and explorer who brought the White Indians to America, made a first-hand genetical study of the San Blas in their native villages, hitherto closed to foreigners, white or black.

How he made a careful analysis of the family histories of the White Indians is told in a scientific report to appear in the next issue of the *American Journal of Physical Anthropology* of which Dr. Aleš Hrdlička, anthropologist of the Smithsonian Institution, is the editor.

"That the condition 'White Indian' is genetical in nature is amply demonstrated by the data contained in the family histories," Dr. Harris will say in the report. "The White Indians thus hold potentialities for race production."

The San Blas Indians, both brown and white, are uncontaminated by Caucasian blood since their customs and race prejudices have assured exceptional "purity." Mr. Marsh's party, of which Dr. Harris was a member, was the first white group that had ever been allowed to stay in one of the San Blas villages overnight. Moreover, the White Indians, as well as the brown from which they came, are clearly Indians, not hybrids, and Dr. Hrdlička in another article in the same journal reports that the San Blas are related to and apparently the same as the famous Mayas of Central America and Mexico who years before the time of Christ had a civilization whose ruins to-day puzzle and astonish archeologists.

In the technical sense the White Indians are partial albinos, but Dr. Harris will say: "Their appearance is obviously the expression of a homozygous recessive condition, due originally to a mutation in one or more genes."

This means that sometime in the past something happened within the germ cells of the brown San Blas Indians that caused the white characteristics of the White Indians to appear. The brown pigmentation usually gains ascendancy over the white or partial albino characteristics in the offspring, but occasionally the white becomes dominant and a brown Indian couple will have a white child.

According to legend the San Blas have hated the white race since the days of the Spanish conquest, and therefore the White Indians have been looked down upon by the browns. Although they were not banished to the hills and did not form separate colonies as previous reports brought by Mr. Marsh indicated, infants that proved to be white upon birth were often killed and even now white Indian men are forbidden marriage altogether. White women are allowed to marry, but for one reason or another, no doubt mainly because the brown women are far more attractive than the white, this is very rare.

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stead of $n = 5$ in the case of Rb will lead to a value of $n^* = 2.80$, approximately, while the choice of $n = 8$ for Cs will yield $n^* = 3.80$, approximately.

It thus appears that Turner's assignment, if true, will necessitate a complete rearrangement of the inner quantum groups—a very serious step and one open to much criticism in the opinion of the present writer. One significant point may be mentioned here. The writer found in the calculations above mentioned that the computed values of the dimensions of the outermost orbits in the ionized alkali atoms (a measure of the ionic radii) obey the Grimm inequality law,⁴ viz.,

$$R_K - R_{NS} > R_{Cs} - R_{Rb} > R_{Rb} - R_K$$

where R_{Na} , R_K , etc., refer to the radii of the ions of sodium, potassium, etc. This law appears to be an extremely fundamental one in connection with atomic characteristics in general. (It is interesting to note that it is followed, as might be expected, by the effective quantum numbers themselves). A rearrangement of the inner groups of orbits in Rb and Cs would vitiate this result, and lead to values for the dimensions of these ions which are much too large in comparison with the dimensions of the lighter alkalis.

In the opinion of the writer it is therefore apparent that Turner's assumption, while leading to an interesting result, can hardly be maintained.

A thorough study of the quantum defect may be expected to be of great value in the development of the Bohr theory, particularly in connection with the analysis of the spectral terms of multiply-ionized atoms. Certain simple relations relevant hereto and admitting of simple interpretation on the Bohr theory are in process of derivation and arrangement by the writer and will be published shortly.

R. BRUCE LINDSAY

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Science, 476-477,
Nov. 21, 1925

WHITE INDIANS OF DARIEN

LIONEL WAFER, a ship's doctor and an associate of Dampier's, has left us an interesting account of the White Indians of the Isthmus of Darien. Wafer fell into the hands of the Darien Indians on the 5th of May, 1681. These were copper-colored natives of the coast, but while a captive among them he had frequent opportunities to observe other Indians of a different complexion. He has this to say about the White Indians:¹

⁴ H. Grimm, *Zs. f. Phys. Chem.*, 5, 353, 1921.

¹ "A New Voyage and Description of the Isthmus of America," by Lionel Wafer (Reprinted from the original edition of 1699) Cleveland, The Burrows Brothers Company, 1903.

There is one Complexion so singular, among a sort of People of this Country, that I never saw nor heard of any like them in any part of the World. The Account will seem strange, but any Privateers who have gone over the Isthmus must have seen them, and can attest the main of what I am going to relate; tho' few have had the opportunity of so particular an Information about these People as I have had.

They are White, and there are of them of both Sexes; yet there are but few of them in comparison of the Copper-colour'd, possibly but one to two or three hundred. They differ from the other Indians chiefly in respect of Colour, tho' not in that only. Their Skins are not of such a White as those of fair People among Europeans, with some tincture of a Blush or Sanguine Complexion; neither yet is their Complexion like that of our paler People, but 'tis rather a Milk-white, lighter than the Colour of any Europeans, and much like that of a White Horse.

For there is this further remarkable in them, that their Bodies are beset all over, more or less, with a fine short Milk-white Down, which adds to the whiteness of their Skins: For they are not so thick set with this Down, especially on the Cheeks and Forehead, but that the Skin appears distinct from it. The Men would Probably have white Bristles for Beards, did they not prevent them by their Custom of plucking the young Beard up by the Roots continually: But for the Down all over their Bodies, they never try to get rid of it. Their Eye-brows are Milk-white also, and so is the Hair of their Heads, and very fine withal, about the length of six or eight Inches, and inclining to a Curl.

They are not so big as the other Indians; and what is yet more strange, their Eye-lids bend and open in an oblong Figure, pointing downward at the Corners, and forming an Arch or Figure of a Crescent with the Points downwards. From hence, and from their seeing so clear as they do in a Moon-shiny night, we us'd to call them Moon-ey'd. For they see not very well in the Sun, poring in the clearest Day; their Eyes being but weak, and running with Water if the Sun shine towards them; so that in the Day-time they care not to go abroad, unless it be a cloudy dark Day. Besides they are but a weak People in comparison of the other, and not very fit for Hunting or other laborious Exercise, nor do they delight in any such. But notwithstanding their being thus sluggish and dull and restive in the Day-time, yet when Moon-shiny nights come, they are all Life and Activity, running abroad, and into the Woods, skipping about like Wild-Bucks; and running as fast by Moon-light, even in the Gloom and Shade of the Woods, as the other Indians by Day, being as nimble as they, tho' not so strong and lusty.

The Copper-colour'd Indians seem not to respect these so much as those of their own Complexion, looking on them as somewhat monstrous. They are not a distinct Race by themselves, but now and then one is bred of a Copper-coloured Father and Mother; and I have seen a Child of less than a Year old of this sort. Some would

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be apt to suspect they might be the Off-spring of some European Father: But besides that the Europeans come little here, and have little Commerce with the Indian-women when they do come, these white People are as different from the Europeans in some respects, as from the Copper-colour'd Indians in others. And besides, where an European lies with an Indian-woman, the Child is always a Mostesa, or Tawney, as is well known to all who have been in the West-Indies; where there are Mostesa's, Mulatto's Etc. of several Gradations between the White, and the Black or Copper-colour'd, according as the Parents are; even to Decompositions, as a Mulatto-Fina, the Child of a Mulatto-man, and Mostesa-woman, Etc.

But neither is the Child of a Man and Woman of these white Indians, white like the Parents, but Copper-colour'd as their Parents were. For so Lacenta (an Indian chief) told me, and gave me this as his Conjecture how these came to be White, That 'twas through the force of the Mother's Imagination, looking on the Moon at the time of Conception; but this I leave others to judge of. He told me withal, that they were but short-liv'd.

CLARENCE QUINAN

SAN FRANCISCO, CALIFORNIA

DR. WILLIAM PINKERTON OTT, associate professor of mathematics at Vanderbilt University, has been appointed head of the department of mathematics at the University of Alabama.

DR. P. M. GINNINGS has resigned as professor of chemistry at Centenary College of Louisiana, to become professor of chemistry at North Carolina College for Women. His place at Centenary College will be taken by Dr. Albert Salathe, professor of chemistry at Sweet Briar College, Virginia.

DR. CARL ARTHUR HEDBLUM, of the Mayo Clinic, Rochester, Minn., has been appointed chief surgeon of the Wisconsin General Hospital, and professor of surgery at the University of Wisconsin Medical School, Madison.

L. P. McCANN has been appointed associate professor of animal husbandry at Colorado Agricultural College to succeed Professor B. W. Fairbanks.

DR. EARL D. MACPHEE, of the University of Alberta, has accepted an appointment in the department of psychology at the University of Toronto.

PROFESSOR LOCATELLO, of Padua, has been nominated successor of Professor Maragliano in the chair of internal medicine at Genoa.

PROFESSOR ANDREW ROBERTSON, professor of mechanical engineering in Bristol University, has been appointed principal of Bristol Merchant Venturers Technical College, in succession to the late Dr. Wertheimer.

SCIENCE DISCUSSION AND CORRESPONDENCE

THE QUANTUM NUMBERS OF THE BOHR ORBITS IN THE ALKALI ATOMS

In a recent article, Dr. L. A. Turner¹ proposes a change in the assignment of quantum numbers to the orbits in certain atoms, as given by Bohr in his latest paper.² This applies particularly in the principal quantum numbers assigned to the outermost orbits in heavier alkali atoms and alkaline earth ions. The essential features of the proposed change may be indicated briefly in the following table:

Element	N	n^*	n_B	n_T	q_B	q_T
Li	3	1.59	2	2	.41	.41
Na	11	1.63	3	3	1.37	1.37
K	19	1.77	4	4	2.23	2.23
Rb	37	1.81	5	6	3.19	4.19
Cs	55	1.87	6	8	4.13	6.13

In the above table, N denotes the atomic number, n^* the effective quantum number of the outermost orbit in the atom, n_B the corresponding principal quantum number as assigned by Bohr, n_T the same as assigned by Turner, while q_B and q_T are the corresponding quantum defects (differences between n^* and n) on the two points of view, respectively. It

can be seen that Turner proposes to increase Bohr's principal quantum numbers for the orbits in Rb and Cs by one and two, respectively. His reason for this step is based on an examination of the variation of the quantum defect with N. For he finds that if we plot q as a function of N, using the Bohr values, we get a broken line with the break occurring at K (as will be seen from an inspection of the table), while if we plot q as a function of N, using Turner's values, we get a very nearly straight line. (It must here be remarked that this also applies to the corresponding case in the ionized alkaline earths and certain other atoms). No theoretical reason can apparently be assigned to the straightness of this line. The present writer wishes to examine available evidence as to the justification of Turner's new assignment.

Numerical calculations have been carried out by the writer³ for the dimensions of the orbits in the Bohr models of the alkali atoms. These show conclusively that Bohr's assignment of the quantum numbers for the outermost orbits is the only one which yields the correct values of the effective quantum numbers, provided, of course, that the inner groups of orbits remain as assigned in the Bohr theory. In fact, a short calculation on the basis of the results there obtained indicates that the assumption of $n = 6$ in-

¹ L. A. Turner, *Phil. Mag.*, Sept., 1924.

² See particularly N. Bohr, *Ann. d. Phys.*, 71, 228, 1923.

³ *Proc. Amer. Phys. Soc.* 23, 552 (A8) 1924. For complete details of calculations see *Jour. of Math. and Phys.*, Mass. Inst. Tech. III, 191, 1924 (May).

APROPOS THE "WHITE INDIANS" OF DARIEN

THE following is a quotation from Joseph Esquemeling, "The Buccaneers of America,"¹ Chapter XXV, published in 1699. Esquemeling is describing his own personal observations.

We sailed from thence [Bocca del Toro] March 23, 1679, and in our way touched at the islands called Zambles. These islands reach eight leagues in length, lying fourteen leagues westward of the River Darien. Being here at an anchor, many of the Indians, both men and women, came to see us. . . . The men here go naked, . . . The men paint themselves sometimes with streaks of black, and the women with red: The women have in their noses a pretty thick ring of gold or silver, and cover themselves with a blanket only: they are generally well featured; *among whom I saw several fairer than the fairest of Europe, with hair as white as the finest flax; 'tis reported of them, that they see better in the dark than in the light.*²

MAYNARD M. METCALF

JOHNS HOPKINS UNIVERSITY

Science, p. 597, June 11, 1926

Science Supplement - Oct. 31, 1924.
INVESTIGATION OF THE WHITE INDIANS
Science Service

THE White Indians of the Darien region of Panama have been given a preliminary inspection by a committee of scientists consisting of Dr. Aleš Hrdlička, anthropologist of the Smithsonian Institution, as chairman; Dr. Charles B. Davenport, of the Station for Experimental Evolution, Cold Spring Harbor, L. I., and Dr. C. W. Stiles, of the U. S. Public Health Service. The committee, in a communication to R. O. Marsh, the explorer who discovered the White Indians, recommends a thorough study of the newly found people in their own land by an expedition of scientists. The committee's letter follows:

"The committee of Drs. Hrdlička, Davenport and Stiles, which you desired to take charge of the study of the 'White Indians' of Panama whom you brought to Washington for the purposes of investigation, held a meeting after these Indians were examined last Friday at which the whole matter was discussed and the following conclusions arrived at:

"The problem of the 'White Indians' is one of much scientific interest, but its satisfactory solution is only possible by a detailed and all-sided study of these people and their families in their own country.

"The committee is of the opinion that these investigations should be conducted simultaneously by anthropology, genetics and pathology.

"In order that the results may be satisfactory, it is requisite that the research should be carried on by experienced and reliable men, whose findings will be accepted with confidence by their colleagues.

"The first condition for a successful carrying on of the work should be, in the opinion of the committee, the training during the remainder of the year of two or three of the persons now in your party in the English language and such terms as it may be necessary to use with the Indians. Considerable questioning will have to be done, particularly by the anthropologist and geneticist, which would be quite impossible without well-qualified interpreters. Two of the men of your party, the fathers of Margaret and Alfred, would seem particularly promising in this direction. It is felt that the two and one third months remaining of this year would be sufficient to form these men into invaluable interpreters for the scientific party.

"The committee would appreciate a statement from you as to whether or not you desire it to take charge of whatever further work is to be done on these Indians."

Mr. Marsh stated recently that he intended to cooperate in every possible way to facilitate carrying out the recommendations of the committee.

"WHITE INDIANS"

CONSIDERABLE NEWSPAPER PUBLICITY has been given to the exhibition in New York of several so-called "White Indians" from Panama. Scientific men were reported at first to have decided that they were not ordinary albinos, or persons in whom the ordinary color of face, eyes and hair is deficient; but according to the *New York Times* the anthropological staff of the Museum of Natural History has now decided that albinism furnishes a complete explanation of all their peculiarities. This opinion was expressed in a report prepared for the Museum's records, which states that the Indians were perfectly usual types of albinism, and compare in all essential details with those known in other Southern American Indian peoples as well as Italians and negroes. We read in *The Times*:

"This explanation of the white Indians differs from others already given by scientific men. When the Indians were exhibited at the Waldorf, the one thing on which the scientific men present agreed was that they were not albinos. With that opinion before them, the members of the Natural Museum staff with equal unanimity agreed that they were nothing else than albinos.

"There is some slight pigment in both the hair and the eyes, hence, they are not complete albinos," says the report. "But this is the most frequent type of human albinism. If it is a disease, it is not a new one, nor one confined to the tropics."

"When a reporter who has seen the white Indian children at close range sought Dr. Louis R. Sullivan, physical anthropologist at the Museum, who drafted the report, he saw on the latter's desk a photograph which at first he believed that of Marguerite, the girl in the group of white Indian children. The resemblance was striking. It turned out, however, to be the picture of a girl from the Zuni tribe of Indians which was in the Museum's records as a typical case of human albinism.

"The report calls attention to the fact that 400 cases of albinism were found by Mr. Marsh within a restricted district. This was characterized as unique.

"There is nothing new in these cases as such," said Dr. Sullivan, "but it is important that Mr. Marsh found so many cases. That is entirely unprecedented. It will undoubtedly lead to scientific men going into the region to make exhaustive studies of the condition. Such a study might lead to important results.

"Previous cases of human albinism were known only in small numbers. We have seen two or three each among the Hopi Indians and the Zuni Indians, and we have photographs here of examples from Italy and among negroes. But never have cases been found in such numbers, and as we consider Mr. Marsh a straight-talking man, this aspect of his discovery will undoubtedly be considered of great interest and will be further studied."

The report follows an examination of the three white Indian children and their brown-skinned adult companions made by the staff at the Museum, the most exhaustive and thorough examination they have received since they have been here. Its text follows:

"Upon first arrival these 'White Indians' were hailed as remnants of a proto-Nordic race, but the theory was quickly exploded by a group of scientists and medical men who examined them at the Waldorf-Astoria Hotel in New York City. Various theories were advanced to account for their condition.

"An expert on tropical diseases has said that they are suffering from a tropical disease akin to the form of leucoderma known in

the West Indies. It is proposed to call this Marsh's disease, in honor of Richard O. Marsh, the latest to call attention to these people. The press reports the rest of the group agreed that the people are abnormal or pathological and not albinos. The consensus of opinion seemed to be that this was a new form of inheritable endocrine disturbance or deficiency.

"In view of the above uncertainty it seems as if more details were due those scientific men who have not had an opportunity to examine these people, and hence have no basis for passing judgment upon the opinions quoted in the press.

"Through the courtesy of Richard O. Marsh, the anthropological staff of the American Museum of Natural History had an opportunity to subject the three 'White Indians' and five normal members of the tribe to complete examinations. Drs. Clark



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MR. MARSH AND THE "WHITE INDIANS," WITH FIVE RED ONES FOR CONTRAST

Wissler, Ralph W. Tower, Milo Hellman and Louis R. Sullivan cooperated in the work. The unanimous opinion of these men is that the three 'White Indians' are albino members of the tribe. They are typical Indians of this type except in two respects: there is a very great diminution of pigment and their heads are a trifle shorter and higher than the darker representatives of the tribe. The diminution of pigment extends to all parts of the body and its appendages.

"The heads of these 'White Indians' have been called acromegalic, but this diagnosis will not bear close scrutiny. No other parts of the body show effects of acromegaly, nor upon close examination does the head. One boy was ten years of age, one boy fourteen and one girl fourteen. Their heads were about normal in size for their ages in relation to those of the adults. The heads were relatively somewhat shorter and higher than the heads of the adults, the former a normal growth relationship, but in this instance exaggerated slightly by the fact that the heads of most of the adults present were artificially deformed. When questioned, the Indians told the story that when a child was born the old women of the tribe took upon themselves the task of shaping the head to conform to their ideal of beauty. This consisted in massaging the head, particularly the frontal region, with the hand. While the effect is not marked, the frontal regions of the heads, and to a lesser degree the vertexes, seem to be abnormally lower and flat. The heads of the albino children seem to be normal undeformed heads. At least they are not deformed in the frontal region. It is just possible that the albinos are not subjected to the same treatment as normal babies, since the albino population is despised and ostracized by the rest of the Indians.

"Interest in the San Blas Indians should center on the fact that there are said to be 400 albino Indians in a fairly restricted area. This is the only unique thing about the condition, since Davenport has estimated that about one albino in a population of ten thousand is a normal ratio."

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tostele like *Sutcliffia* could give rise to the cycadean woody cylinder. But the course of change could as easily occur in the reverse. The Medullosan protostelic strands could come to dominate, as the small amount of secondary wood in certain *Heterangium*s proves. For, as stated, each stele of such a type as *Medullosa Anglica* is the equivalent of the single cylinder of a *Heterangium*, both as to the primary and secondary wood; while the *Heterangium* primary wood extends to the stelar center in contrast to the medullated *Lyginopteris*. Yet in no case is a pith absent, and it is but a step to the *Myeloxylon* condition, foreshadowing, if not actually representing, early monocotyledonous structure. Again, Noé and his students have found the root structures which accord with these views of change toward the monocotyledons.

That the Medullosans include some of the precursors of later and higher types of flowering plants is a likelihood enhanced by the recent discoveries in the Devonian of the State of New York. The plants of the Gilboa forest are called *Eospermatopteris*, and are referred directly to the seed ferns. If the redintegration of *Eospermatopteris* by Dr. Goldring as based on the small cupulate seeds, microspore-disks, foliage and associated stumps is correct (and I believe it to be essentially so), an early Medullosan type comes into view. In the description of the stems it is said that some of the smaller ones show (well within the outer stereome zone) "toward the center an irregular ring of sclerenchyma tissue, and within this ring and to some extent outside it irregularly scattered strands of sclerenchyma tissue." All which befits a Medullosan, unless secondary to maceration and pressure. But the stumps show excellent preservation, taken as casts. Marked displacement or flotation of the wood or of any of the other tissues during fossilization seems little in evidence and this opinion is given from a huge symmetrical specimen brought from Gilboa by Professor Dunbar, of Yale. Apparently the Medullosan record extends all the way through the lower Carboniferous down into the Devonian, although what was already known of the group, particularly the relation to *Heterangium*, would have permitted the assumption of this early appearance, even as a giant form.

Going further, the symmetrically lobated microspore-bearing disk *Codonotheca* has not had the attention it deserves, not even from Kidston and Jongmans when their material demanded comparison. *Codonotheca* is probably a Neuropterid of Medullosan affinity, and it looks like some cupulate *Rhabdocarpus* seed attributed to *Medullosa*. The campanulas are extremely abundant. Split nodules from Mazon Creek no larger than one's hand sometimes bear three or four of the disks, some of which contain quantities of microspores; most singular if these merely

drifted from other plants into position along the bundle ridges of the campanula. That is, the evidence, whether *Rhabdocarpus* and *Codonotheca* are ever amphisporeangiate or not, suggests that some of the Medullosans bore flowers constructed on the cycadeoid and angiospermous plan.

The Medullosans lasted too long in geologic time, were too cosmopolitan, too varied of structure, to be unquestioningly classed as seed ferns or cycadophytes through all their record. If they advanced floristically as did the cycadeoids, and there is much reason to believe they did, the seed fern categories will shortly need revision. "Pteridosperms" have become over-inclusive in fossil plant classifications, more especially those of Seward and Scott. But a few more years will bring determinative discoveries. In the prosecution of science nothing is so unfortunate, nothing so to be feared, as failure to admit the import of new or previously obscure facts which require expression and discussion.

G. R. WIELAND

YALE UNIVERSITY

WHITE INDIANS OF DARIEN

THE story of the Marsh-Darien Expedition, organized and led by Richard O. Marsh, of Brockport, N. Y., has been told in detail in the daily press to the last of March, when it left the first base-camp, at Yavisa, in the lower Chucunaque Valley. During the preceding seven weeks southern Darien had been quite thoroughly explored without finding any blonde Indians, although Mr. Marsh had seen several at Yavisa in the summer of 1923. It is probable that any white Indians residing in that territory had hidden themselves because of the wild reports concerning the purposes of the expedition. But Mr. Marsh remained confident that white Indians would be found in the upper Chucunaque basin or in the Cordillera of northern Darien.

By the end of March, the Chokoi tribe in the lower Chucunaque Basin and the Cunas of the upper Tuyra Basin had been studied by John L. Baer, with skull measurements, and a considerable collection was made of Indian ornaments, utensils and structures. Many thousand feet of motion-picture film was taken by Charles Charlton, the Pathé photographer. Intensive study was made by Charles M. Breder of the lower vertebrates, and large collections secured. A large number of skins of birds and mammals were obtained by J. A. Johnson, the naturalist and taxidermist of the party. Some physiographic and meteorologic data also were obtained by the writer.

The failure to find any blonde Indians in southern Darien, while disappointing to Mr. Marsh, did not shake his confidence that they existed and that they would be found in the north. On March 27 the Ya-

visa camp was broken, and the writer returned to Panama with the collections to that date and part of the camp equipment, while the party of 12 white men and 15 Panamanians and negroes, in six piraguas with heavy equipment and supplies, "burned their bridges" and pushed north into entirely unknown and reputedly hostile territory. The northern district is occupied by Indian tribes that have inspired their neighbors with fear and have wisely and justly excluded intruders and have kept their blood pure.

The physical difficulties encountered by the party on the northward hike were much greater than any obstruction offered by the Indians. The time was the beginning of the wet season, while the rivers were yet low and the channels filled with log-jams and the scanty flow liable to sudden and heavy floods. In one stretch ten days were used in going 20 miles, it being necessary to chop and dynamite paths for the piraguas. During this terrible trip the party was reduced, by expiration of leave, by sickness, death and desertion. Senor Raul Brin, the Panamanian representative, was attacked by fever, returned to Panama and died. Mr. Baer had been weakened by blood-poisoning, due to "screw-worms," and died at Caledonia Bay after heart-breaking carriage across the mountains. The negro and Panamanian helpers dropped away, Mr. Breder fell ill and went to Colon, and the only original members of the party who remained with Marsh to the time when he found the white Indians were Charlton and Johnson.

The Indian people of the Atlantic coast of Darien, generally known as the San Blas, are a superior group in an advanced stage of culture, and must not be called "savages." They are threatened by the white man's diseases, by encroachment of the negroes and by what they claim to be unjust treatment by the authorities. When Mr. Marsh had crossed the Cordillera and reached Caledonia Bay with his reduced party he found the Indians in danger from smallpox. Going down to the coast to a navy wireless station on the coast of Colombia he obtained doctors and vaccine from Colon and checked the epidemic. This, along with extended conferences with the chiefs, won the confidence and friendship of the Indians. The chiefs, in assembly, agreed to follow his advice and accept his help in safeguarding their people. Then Mr. Marsh said that he wished to see their white people. They replied that there were no white Indians. Marsh told them that he knew there were, for he had proofs and had seen several. He also said that their white Indians would interest the people of the United States and form a bond of sympathy which would aid in securing their safety and protecting their rights. Then they called in the white Indians from their seclusion in the hills, and they appeared in great numbers. The moving and still pictures taken by Charlton will be evidence. About 400 blondes were seen

and information given that they have villages in the hills of the Cordillera. Such a village had been seen by an army aviator.

Mr. Marsh was told that their legends were to the effect that white members had existed in the tribes from ancient times, but that their hatred of white Europeans, on account of the Spanish cruelty, had resulted in dislike of their own white people, and that they had tried to suppress them. The effect was their seclusion and segregation in less accessible districts.

Three white children were selected by Mr. Marsh from among many that were offered to him, and with five dark adults they were brought to New York on July 6. One of the blonde children is a robust girl of 14 years, the father and mother being among the five dark adults. These parents have had seven children, five being white and two dark. The mother's mother was a white Indian. The two other children are boys, one 14 and one 10 years, the latter selected as the best example seen of the dark blotching of the white skin. These children have golden hair, hazel or hazel-blue eyes and pink gums. Mr. Marsh says that he did not see a typical albino among the hundreds of blondes. He believes, from his observations on the San Blas, that there are at least three types of Indians, possibly due to the commingling on the isthmus of migrations from the northern and southern continents. He thinks that the white girl and her parents represent a type of larger frame, larger heads and generally a more lusty physique than the ordinary San Blas. He feels sure that the blonde strain will be found limited to this type.

We find here an interesting ethnologic problem. The evening of July 8 the Pathé News gave a dinner at the Waldorf-Astoria to Mr. Marsh and his Indians and members of his expedition, to which were invited a number of anthropologists. The white children were examined at this conference, and it was the unanimous opinion that the phenomenon was not albinism. Major Cuthbert Christy, of England, a specialist in tropical diseases, thought it was pathologic, due to some physiologic condition inhibiting pigmentation.

The anthropologists of the American Museum of Natural History examined the Indians and attributed the whiteness to albinism. Their report, given currency in the daily press and in the *Literary Digest* of August 9, contains, as stated by Mr. Marsh, an unfortunate error, that the smaller size of the heads of the dark Indians is due to massaging in infancy. This statement was based on reply by the Indians to questions which they misunderstood. When subsequently questioned by Mr. Marsh they repudiated with scorn and amusement the idea of any manipulation of the heads of the children.

In connection with the recent meeting at Toronto of the British Association three members of the Sec-

tion of Anthropology visited the Indians at their camp on the St. Lawrence, in the absence of Mr. Marsh, and concluded that the white characters were a form of albinism, and that ostracism had encouraged its propagation, as summarized by the chairman, Dr. F. C. Shrubbsall, in a short presentation at the close of the meeting. Following this paper, Mr. Marsh made the following statement:

(1) The difference in size and shape between the skulls of the blonde Indians and those of the standard San Blas has been attributed to artificial deformation of those of the dark infants, while those of the white infants are natural. This is wholly untrue. The San Blas Indians do not massage nor in any way alter the heads of their children. The rounder, broader and higher crania of the whites can not be explained in that way.

(2) The timid demeanor of the children and the behavior of their eyes when under inspection by strangers is misleading. They are not mentally deficient nor abnormal in any way. On the contrary, they are unusually alert and keen, with excellent memory. They are rapidly learning English.

(3) That the blonde Indians do not spring from the normal San Blas Indians but from the larger and more robust type, which occupy the hills back from the coast.

It is evident that the great number of these blonde Indians and their birth from both white and dark parents present an interesting and important problem, either ethnologic or medical. Thus far we have the following tentative explanations:

(1) A peculiar form of transmissible and stabilized albinism. This names but does not explain. The blonde complexion, the procreation and the large number rule out ordinary albinism.

(2) Some disease or pathologic condition preventing pigmentation. It appears that the physiologic defect is transmissible as an acquired character.

(3) That the blondes are biologic "sports." This argues for a new variety or race of the human species.

(4) That the phenomenon is atavism, the effect of a long-ago infusion of white or Nordic blood. The anthropologists are inclined to discredit the many legends of ancient or Pre-Columbian immigration from Europe. But it may be wise to critically review the historic narratives.

One important matter is not yet determined, that is, if the white parents ever have dark children.

Summarizing, it would seem that we may be limited to two views. The first three of the above explanations suggest the initiation of a new white race, and fortifies the belief of many anthropologists that our own white race sprang from dark ancestry. Either this explanation or the ancient introduction of Nordic blood.

All agree that Mr. Marsh deserves great credit for his persistence in the face of great difficulties in mak-

ing a very important discovery. Dr. Aleš Hrdlička has said:

... The phenomenon deserves a thorough scientific investigation, and Mr. Marsh deserves the thanks of American and British anthropologists for having brought to their attention a subject of considerable scientific interest and importance.

It is the purpose of Mr. Marsh to make another expedition to Darien, equipped for thorough ethnologic and medical study. The Indians are very reticent about their family and tribal affairs, and it will require tactful and sympathetic handling to obtain the full truth concerning this matter.

Mr. Marsh is also intent on finding some way of establishing ownership by the Indians of the lands which they have held so long, of protecting them from the dangers that surround them, of assisting them in sanitation and agriculture and of helping them to live their own life in their own way. They are an admirable people and should not be encouraged to adopt the many vices which we call civilization.

The moving pictures taken by Mr. Charlton will soon give on the screen a vivid story of the Marsh Expedition.

H. L. FAIRCHILD

UNIVERSITY OF ROCHESTER

SCIENTIFIC EVENTS

THE WORLD POWER CONFERENCE¹

THE World Power Conference held in London, June 30 to July 12 was, from many points of view, the most notable gathering of its kind ever convened. It attracted large representations of engineers from many nationalities to London, and the various sections of the program reviewed the power problems of the world with a completeness that has never before been attempted.

The conference was organized by the British Electrical and Allied Manufacturers Association in cooperation with numerous technical, scientific and commercial organizations. The purpose was to consider the sources of world power by evaluating the resources of each country by comparing experiences in the development of scientific agriculture, irrigation and transportation, by engineering conferences, by consultations of power consumers and power-machinery manufacturers, by financial and economic discussions, and by conferences looking to the establishment of a permanent world bureau for the collection of data and the exchange of industrial and scientific information.

The conference was formally opened on Monday

¹ From *Mechanical Engineering*.

Oct. 17, 1924

SCIENCE NEWS

THE EXTRACTION OF GOLD FROM SEA WATER

Science Service

PROFESSOR FRITZ HABER, of the University of Berlin, and inventor of the Haber process for the fixation of nitrogen, who created somewhat of a sensation some time ago with the announcement that he had devised a method of extracting gold from sea water, is now in the United States following this same line of research.

Professor Haber has requested officials of the United States Bureau of Fisheries to furnish him samples of the coastal waters of the North American continent for analysis. He explained to them that he does not consider his experiments commercially valuable and is pursuing them only with the hope of increasing scientific knowledge. The actual procuring of gold from sea water is an accomplished fact, but the quantities are so minute and the expense so great that he believes the process never can be made profitable.

Professor Haber expects to discover the interrelation of waters, the courses of ocean currents, and the history of various sections of the sea through the mineral deposits. The amounts of mineral, whether gold, silver or less valuable minerals, differ according to geographic location of the water and in many cases this difference is very marked. Professor Haber believes that the analysis of water as to its mineral quantities may prove a valuable asset to oceanography, just as analysis of rocks is valuable to the geologist in tracing the history of different sections of the country.

It was indicated that the Bureau of Fisheries may comply with Professor Haber's request and that the cooperation of other government departments dealing with the ocean may be asked.

The best available data at present on the presence of gold in sea water gives the following figures for different locations, bearing out Professor Haber's claims of wide variation according to locality. Deep sea water from the Atlantic Ocean has from 0.015 to 0.267 part of gold per million parts of liquid; water from Christiania, Fjord, Norway, from 0.005 to 0.006; from the coast of New South Wales, 0.032 to 0.065; and from the coast of New Zealand 0.005 part of metal per million parts of sea water. On land the lowest gold deposits which it has been found profitable to operate contain about 0.14 part of gold to per million parts of gravel which does not have to be crushed to extract the precious metal. The granites of California and Nevada have about 0.37 parts of gold per million; the sandstone, 0.03, and the limestone 0.007. It will be noted that some sea water contains nearly twice as much gold as the lowest grade gold deposit on land found profitable to operate.

WHITE INDIANS

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AN expedition to penetrate unknown territory of Panama occupied by the White Indians discovered this

spring by R. O. Marsh, American civil engineer and explorer, is now being organized here with the cooperation of leading scientific institutions.

The Marsh expedition, which returned to the United States in July, bringing with it three White Indian children and five brown Indians of the region, explored a large area of territory never before entered by white men. But the country occupied by large settlements of the White Indians was not entered, though flown over by airplane. It will be the objective of the party to leave this country in January.

The party of Darien Indians, including the two White Indian boys, Marguerite, a fourteen-year-old White Indian girl, her father and mother, both brown Indians, and three grown brown Indian men, one of them a leading chief, has spent the summer at Mr. Marsh's summer home near Prescott, Ontario, on the St. Lawrence River. The party is now *en route* to Washington to be presented to President Coolidge and studied by the scientists at the Smithsonian Institution, the U. S. National Museum, National Research Council and the Carnegie Institution of Washington.

In the summer of 1923 Mr. Marsh, while exploring in the Darien region of Panama, saw and photographed at long distance seven White Indians who had come to a settlement in the lower waters of the Chucunaque River. Legends of large White Indian settlements led him to equip and head a scientific expedition to explore the unmapped country into which the Indians have previously allowed no white men to penetrate. Before the explorations by land, Mr. Marsh, with the cooperation of the U. S. Army, conducted an airplane reconnaissance of Darien that revealed major mistakes in existing maps.

The San Blas Indians, which occupy the Atlantic coast of the Darien region, have never heretofore allowed white men to stay overnight within their territory. Mr. Marsh entered the country from the Pacific side and after a hard journey up the Chucunaque River and over the San Blas Mountains, arrived at the "back door" of the San Blas tribes. By tactful treatment of the Indians and by furnishing them medical assistance, he finally won the confidence of the chiefs. Until he got the cooperation of the Indians he was unable to see even one White Indian at close range; once the San Blas Indians were won as friends, four hundred White Indians were summoned for Mr. Marsh's inspection and he was allowed to bring three of the children to the United States.

Among the brown San Blas Indians of the Darien coast the White Indians are outcasts. They are forced to live in segregated settlements on the south or Pacific side of the mountains along the coast. White Indian children are sometimes born to brown Indian parents who are of a distinct and stockier build than the typical San Blas Indian and who have White Indian ancestors. These white children are allowed to remain in the coast settlements only until they are old enough to look out for themselves. Then they are banished and sent into the White Indian settlements up in the mountains.

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Wide World Photos

"PALE FACE" INDIANS FROM PANAMA

Three "White Indian" children brought to New York by Richard O. Marsh from the little known San Blas Country of Panama, photographed at their New York hotel. The two boys and a girl, ranging in age from ten to sixteen, have golden white hair and eyebrows, hazel eyes and pink skin. Their parents are said to be copper colored. There are said to be hundreds of blond Indians in the region.

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Scientific Monthly Aug. 1924.

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OCEANOGRAPHIC SURVEY BY THE HYDROGRAPHIC OFFICE

Science Service

PLANS for the most complete survey of the ocean from top to bottom ever attempted have been inaugurated by a conference representing scientific branches of the government and allied institutions held at Washington under the auspices of the Hydrographic Office of the U. S. Navy.

Definite routes and areas have not yet been chosen, but the preliminary discussion indicates that instead of a globe-girdling expedition, a comparatively small section of the seas will be selected for intensive study. The Aleutian Islands region of Bering Sea and the Caribbean Sea are under consideration as offering unusual opportunities for scientific investigation, with the latter most favored.

One or more ships will probably be fitted out with a complete laboratory and equipped with the latest scientific apparatus for the first cruise. The sea bottom will not only be mapped, but the composition of the water, its density, temperature and currents which affect the distribution of marine plant and animal life will be studied at all depths. Beside the investigation of the water and the life in it, specialists in various sciences will probably be landed on oceanic islands within the area covered by the ship.

In emphasizing the importance of this investigation, it was pointed out that five sevenths of the surface of our globe is covered by the waters of the seas. This water area can produce far more food than all the land can ever be made to yield, and one of the purposes of the expedition will probably be to take an inventory of such food possibilities which will be needed if our population continues to increase. Fish, mollusks and marine animals are dependent upon the microscopic plants that grow in the sea as far down as the sunlight penetrates. The floating mass of minute forms of vegetable and animal life, collectively called "plankton," varies greatly with slight changes in the temperature and composition of the sea water, according to laws not yet discovered, but which the proposed expedition may aid in understanding.

The exploring ship will map the ocean bottom by means of the new sonic finder which determines depths by measuring the lapsed time between sending down a sound and getting back the echo from the bottom. By this instrument, soundings can be made by a ship in motion and much more easily and quickly than by the old way of heaving the lead.

"WHITE INDIANS"

Science Service

So very little is known of the working of the laws of heredity among albinos that an opportunity to study a whole community of these strange human beings is exceedingly alluring to anthropologists. Dr. Clark Wissler, curator of anthropology of the American Museum of

Natural History, says that the colonies of "White Indians," discovered along a tributary of the Chucun- aque River in Panama by the Richard O. Marsh expedition, should prove to be a sort of laboratory.

Dr. Wissler inclines to the opinion that albinism will account for these human puzzles, who are arousing keen interest in New York City, where they have just arrived. Other anthropologists, however, point out that albinism would not explain the fact that they are round-headed, large-headed and large-boned, unlike other Indians of the San Blas tribes. Indeed, this is the one inexplicable thing about the new arrivals. Their skeletal peculiarities have led to many ingenious attempts to supply them with a history.

All the anthropologists agree that they can not be half-breeds. The crossing of dark with light races results in a smooth-toned skin, of whatever shade, and not in "this inhuman complexion," as Dr. Wissler calls it. To compare these white Indians with Swedes or other northern races is most unobservant, since the latter have ruddy and pronounced coloring, not a spectral pallor.

What, then, are the other possibilities? First, that they may be a separate and ancient race. Of this the anthropologists are skeptical. They recall, however, that in Central America as in Mexico the legend of a "white redeemer" who once dwelt among the people and would some day return, is common. Also it must be remembered that "white Indians" are the subject of old and authoritative mention. They have existed in the Zuni pueblo as far back as the records go. Columbus wrote of seeing white people in Darien. Von Humboldt related that they were to be found in Panama.

Circumstances might well have favored the development of an albino race. That is the second possibility, and the one best supported by known facts. The white Indians have always been ostracized by their San Blas neighbors, who fear racial contamination and drive them off into the jungle. The enforced segregation might easily have perpetuated albino traits. But then the skeletal differences remain to be accounted for. They also mar the third possibility, suggested by a scientist who has studied native African races—that these white Indians may be affected by a disease which prevents the nerves from supplying coloring matter (melanin) to the skin, hair and iris of the eyes.

THE ARMY WORM OUTBREAK

Science Service

THE outbreak of the army worm in Illinois has been brought under control, according to Professor George A. Dean, of the U. S. Department of Agriculture, who declared that the pest will not prove as damaging as was feared, not reaching the extent or severity of the attack ten years ago. A similar outbreak in Iowa is reported by W. P. Flint, state entomologist of Iowa, to have been checked before it got well under way.

This caterpillar of an insignificant moth or "miller" has been represented as moving very rapidly over several

stead of $n = 5$ in the case of Rb will lead to a value of $n^* = 2.80$, approximately, while the choice of $n = 8$ for Cs will yield $n^* = 3.80$, approximately.

It thus appears that Turner's assignment, if true, will necessitate a complete rearrangement of the inner quantum groups—a very serious step and one open to much criticism in the opinion of the present writer. One significant point may be mentioned here. The writer found in the calculations above mentioned that the computed values of the dimensions of the outermost orbits in the ionized alkali atoms (a measure of the ionic radii) obey the Grimm inequality law,⁴ viz.,

$$R_K - R_{NS} > R_{Cs} - R_{Rb} > R_{Rb} - R_K$$

where R_{Na} , R_K , etc., refer to the radii of the ions of sodium, potassium, etc. This law appears to be an extremely fundamental one in connection with atomic characteristics in general. (It is interesting to note that it is followed, as might be expected, by the effective quantum numbers themselves). A rearrangement of the inner groups of orbits in Rb and Cs would vitiate this result, and lead to values for the dimensions of these ions which are much too large in comparison with the dimensions of the lighter alkalis.

In the opinion of the writer it is therefore apparent that Turner's assumption, while leading to an interesting result, can hardly be maintained.

A thorough study of the quantum defect may be expected to be of great value in the development of the Bohr theory, particularly in connection with the analysis of the spectral terms of multiply-ionized atoms. Certain simple relations relevant hereto and admitting of simple interpretation on the Bohr theory are in process of derivation and arrangement by the writer and will be published shortly.

R. BRUCE LINDSAY

SLOANE LABORATORY,
YALE UNIVERSITY

WHITE INDIANS OF DARIEN

LIONEL WAFER, a ship's doctor and an associate of Dampier's, has left us an interesting account of the White Indians of the Isthmus of Darien. Wafer fell into the hands of the Darien Indians on the 5th of May, 1681. These were copper-colored natives of the coast, but while a captive among them he had frequent opportunities to observe other Indians of a different complexion. He has this to say about the White Indians:¹

⁴ H. Grimm, *Zs. f. Phys. Chem.*, 5, 353, 1921.

¹ "A New Voyage and Description of the Isthmus of America," by Lionel Wafer (Reprinted from the original edition of 1699) Cleveland, The Burrows Brothers Company, 1903.

There is one Complexion so singular, among a sort of People of this Country, that I never saw nor heard of any like them in any part of the World. The Account will seem strange, but any Privateers who have gone over the Isthmus must have seen them, and can attest the main of what I am going to relate; tho' few have had the opportunity of so particular an Information about these People as I have had.

They are White, and there are of them of both Sexes; yet there are but few of them in comparison of the Copper-colour'd, possibly but one to two or three hundred. They differ from the other Indians chiefly in respect of Colour, tho' not in that only. Their Skins are not of such a White as those of fair People among Europeans, with some tincture of a Blush or Sanguine Complexion; neither yet is their Complexion like that of our paler People, but 'tis rather a Milk-white, lighter than the Colour of any Europeans, and much like that of a White Horse.

For there is this further remarkable in them, that their Bodies are beset all over, more or less, with a fine short Milk-white Down, which adds to the whiteness of their Skins: For they are not so thick set with this Down, especially on the Cheeks and Forehead, but that the Skin appears distinct from it. The Men would Probably have white Bristles for Beards, did they not prevent them by their Custom of plucking the young Beard up by the Roots continually: But for the Down all over their Bodies, they never try to get rid of it. Their Eye-brows are Milk-white also, and so is the Hair of their Heads, and very fine withal, about the length of six or eight Inches, and inclining to a Curl.

They are not so big as the other Indians; and what is yet more strange, their Eye-lids bend and open in an oblong Figure, pointing downward at the Corners, and forming an Arch or Figure of a Crescent with the Points downwards. From hence, and from their seeing so clear as they do in a Moon-shiny night, we us'd to call them Moon-ey'd. For they see not very well in the Sun, poring in the clearest Day; their Eyes being but weak, and running with Water if the Sun shine towards them; so that in the Day-time they care not to go abroad, unless it be a cloudy dark Day. Besides they are but a weak People in comparison of the other, and not very fit for Hunting or other laborious Exercise, nor do they delight in any such. But notwithstanding their being thus sluggish and dull and restive in the Day-time, yet when Moon-shiny nights come, they are all Life and Activity, running abroad, and into the Woods, skipping about like Wild-Bucks; and running as fast by Moon-light, even in the Gloom and Shade of the Woods, as the other Indians by Day, being as nimble as they, tho' not so strong and lusty.

The Copper-colour'd Indians seem not to respect these so much as those of their own Complexion, looking on them as somewhat monstrous. They are not a distinct Race by themselves, but now and then one is bred of a Copper-coloured Father and Mother; and I have seen a Child of less than a Year old of this sort. Some would

be apt to suspect they might be the Off-spring of some European Father: But besides that the Europeans come little here, and have little Commerce with the Indian-women when they do come, these white People are as different from the Europeans in some respects, as from the Copper-colour'd Indians in others. And besides, where an European lies with an Indian-woman, the Child is always a Mostesa, or Tawney, as is well known to all who have been in the West-Indies; where there are Mostesa's, Mulatto's Etc. of several Gradations between the White, and the Black or Copper-colour'd, according as the Parents are; even to Decompounds, as a Mulatto-Fina, the Child of a Mulatto-man, and Mostesa-woman, Etc.

But neither is the Child of a Man and Woman of these white Indians, white like the Parents, but Copper-colour'd as their Parents were. For so Lacenta (an Indian chief) told me, and gave me this as his Conjecture how these came to be White, That 'twas through the force of the Mother's Imagination, looking on the Moon at the time of Conception; but this I leave others to judge of. He told me withal, that they were but short-liv'd.

CLARENCE QUINAN

SAN FRANCISCO, CALIFORNIA

EARLY REFERENCES TO THE WHITE INDIANS OF PANAMA [Vol. 23, No. 8]



NORMAL AND WHITE-INDIAN CHILDREN

Figure 10

In stature and facial characteristics the albinos resemble the other members of the tribe. The reduced tolerance to light is indicated by the squinting of the two albinos. Photographs by R. O. Marsh. Courtesy of Science Service.

THE press in recent years has carried extensive accounts of native white people in Panama. There is one phase of the situation which has not received the emphasis that it deserves. It seems that albinism has persisted in that region for a long time. For some unaccountable reason the story of finding white people has had a romantic attraction for early American explorers. Rumors were common among the first adventurers in America. Humboldt writing about 1700 speculated on these rumors as follows: "Were they albinos such as have been found heretofore in the Isthmus of Panama?" Just what he is referring to is not certain but a very clear account is recorded by Wafer in 1681 which has bearing on these rumors. Wafer was a buccaneer who, after the manner of pirates of the time, wrote a book when he retired from his adventures. The necessities of his profession forced him into the territory of the white Indians. The easier crossing at Panama was so strongly held, that the buccaneers made use of the crossing from the Gulf of Darien. While cross-

ing, Wafer was wounded and forced to stay behind for some months among the Indians. He had an obvious gift for observation and his notes, reprinted below are the best record even today of the nature of the white Indians. His account opens with description of the normally pigmented Indians:

"Their natural complexion is a copper-colour, or orange-tawney; and their eye-brows are naturally black as jet. They use no art to deepen the colour either of their eye-brows, or the hair of their head; but they daub it with oil to make it shine; for like other Indians they anoint themselves all over, whether for beauty to make the skin smooth and sleek, or to supple it and keep it from parching, or to hinder too much perspiration in this hot country, I know not.

"There is one complexion so singular, among a sort of people of this country, that I never saw nor heard of any like them in any part of the world. The account will seem strange, but any privateers who have gone over the Isthmus must have seen them, and can

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THREE WHITE INDIANS

Photograph by R. O. Marsh

Figure 11

These were the children brought to the United States by Dr. Marsh. The rediscovering of albinos among these Indians raised a storm of controversy. Wafer's detailed account of them in 1681, gives as long a record of human albinism as is in existence today.

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"They are white, and there are of them both sexes; yet there are but few of them in comparison of the copper-coloured, possible but one to two or three hundred. They differ from the other Indians chiefly in respect of colour, though not in that only. Their skins are not of such a white as those of fair people among Europeans, with some tincture of a blush or sanguine complexion; neither yet is their complexion like that of our paler people, but 'tis rather a milk-white, lighter than the colour of any Europeans, and much like that of a white horse.

"For there is this further remarkable in them, that their bodies are beset all over, more or less, with a fine short

milk-white down, which adds to the whiteness of their skins: For they are not so thick set with this down, especially on the cheeks and forehead, but that the skin appears distinct from it. The men would probably have white bristles for beards, did they not prevent them by their custom of plucking the young beard up by the roots continually; But for the down all over their bodies, they never try to get rid of it. Their eye-brows are milk-white also, and so is the hair of their heads, and very fine withal, about the length of six or eight inches, and inclining to a curl.

"They are not so big as the other Indians; and what is yet more strange, their eye-lids bend and open in an oblong figure, pointing downward at the corners, and forming an arch or figure of a crescent with the points



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Retake of Preceding Frame

**EVIDENCE OF MENDELIAN SEGREGATION****Figure 12**

Normally pigmented parents and a "white" child among the Indians of Panama. Photograph by R. O. Marsh. Courtesy of Science Service.

downwards. From hence, and from their seeing so clear as they do in a moonshiny night, we us'd to call them Moon-ey'd. For they see not very well in the sun, peering in the clearest day; their eyes being but weak, and running with water if the sun shine towards them; so that in the day-time they care not to go abroad, unless it be a cloudy dark day. Besides they are but a weak people in comparison of the other, and not very fit for hunting or other laborious exercise, nor do they delight in any such. But notwithstanding their being thus sluggish and dull and restive in the day-time, yet when moon-shiny nights come, they are all life and activity, running abroad, and into the woods,

skipping about like wild-bucks; and running as fast by moon-light, even in the gloom and shade of the woods, as the other Indians by day, being as nimble as they, though not so strong and lusty.

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"But neither is the child of a man and woman of these white Indians, white like the parents, but copper-colour'd as their parents were. For so Lacenta told me, and gave me this as his conjecture how these came to be white. That 'twas through the force of the mother's imagination, looking on the moon at the time of conception; but this I leave others to judge of. He told me withal, that they were but short-lived.

"Both these and the copper-coloured Indians use painting their bodies, even of the sucking children sometimes. They make figures of birds, beasts, men, trees, or the like, up and down in every part of the body, more especially the face; But the figures are not extraordinary like what they represent, and are of different dimensions, as their fancies lead them." (*Quotation from: A New Voyage and Description of the Isthmus of America. By Lionel Wafer. Pages 133-136. Reprinted from the original edition of 1699; Edited by George Parker Winship, Librarian of the John Carter Brown Library. 1903.*)

It appears then that the strain of albinism, if these are albinos, was as prevalent some centuries ago as it is today. If this is true, it is beyond the possibility of speculation to estimate the number of centuries that albinism has persisted in Panama. Certainly it is a long clear record of human albinism.

HARRY V. HARLAN.

U. S. Department of Agriculture.

Book Advertisements and A-G-A Book Service

In this issue appear two advertisements of books covering various phases of the field of interest of members of the American Genetic Association. It is believed that such announcements of important new books and of standard works will be a real addition to the JOURNAL. Furthermore, the income from the sale of advertising space is much needed to enable us to keep up with our new publication schedule, *on time!*

In these times especially, to continue to sell advertising space in the JOURNAL, we must demonstrate to publishers, by books actually sold, that advertisements in the JOURNAL are a good investment.

Under no other conditions will we continue to receive the advertising patronage of publishers. Thus in the purchase of books advertised in the JOURNAL OF HEREDITY, and even of books reviewed in our JOURNAL, the mention of the fact that the announcement of the book "*was seen in the JOURNAL OF HEREDITY*" is invaluable. Better yet, members are urged to place orders for such books through the A-G-A Book Service. The book will cost less, and such purchases are the most convincing possible evidence that the JOURNAL OF HEREDITY is a desirable medium for advertising genetic, eugenic and biological books. Members are urged to bear this in mind in ordering books.

2 Wash. Star - Feb. 27, 1925.

PANAMAN INDIANS CHARGE EXCESSES

Marsh Translates Accusation Women Were Assaulted and Land Stolen.

By the Associated Press.

PANAMA, February 27.—The Panaman government today made public a document, drawn up in English and signed by various Tule, San Blas Indian chiefs, in which the San Blas people demand the right of independence. The document was translated by Richard O. Marsh, an American explorer, allegedly at the request of the Tule National Congress.

It is considered probable that the recent attacks on Panamans by the Indians, in which some 20 Panamans were killed, had their basis in charges made by the Congress. The document charges that the Panaman settlers and authorities permitted excesses in the region by forcing Indian women to dance and fining them \$50 if they refused; both beer and liquor were sold in dance halls and Indians not only were encouraged but forced to buy. The dances are described as having become debaucheries and it is declared that Indian women and young girls were violated.

It is alleged that the Panaman governor of San Blas practiced various systems of extortion, and that rum, whisky, powder, shot and shotguns were sold in stores established by him, contrary to the laws of Panama.

Charged Land Stolen.

It is charged that land was illegally taken by banana companies and that rubber was stolen and the trees ruined. It is declared in the document that under international law the San Blas territory is considered part of the Panaman republic, under the constitution of Panama and articles in the Hay-Bunau Varilla treaty, the United States assumed the obligation to intervene at any time and any place in Panama to uphold constitutional law and peace.

"It appears to us," says the document, "that America cannot, in equity, assume the role of a protectorate over the Republic of Panama, regard our people and territory as part of Panama and refuse our people the same measure of guaranteed protection and justice it accords other human elements in the country."

Villages Threatened.

The document said the governor had threatened to attack and burn Indian villages.

"Such statements coming from Panaman officials," declares the document, "can only be regarded as an open declaration of war. * * * We accept the challenge. The Panaman government has forfeited further just claim to sovereignty over our race and territory, and henceforth the Tule Nation is hereby declared independent."

The document ends with a petition to the United States Government to accept a protectorate over Tule.

The British Minister at Panama has instructed H. A. Ford, consul at Colon, to leave for San Blas on the United States cruiser Cleveland to protect British interests in the troubled area.

West Indies

Central America

Folder 1

Humboldt, in speaking of what he describes as "that fine race of people the Caribs", remarks:

"The cruelties exercised by Europeans have entirely exterminated them from the West India Islands, and the coasts of Darien;" and adds: "the only vestiges now remaining throughout the whole of the eastern West India Islands are skeletons petrified, or rather enveloped in a limestone containing madrepores."--Humboldt's Personal Narrative, Vol.3, pp.77, 78, 1885.

LUCAYAN REMAINS ON THE CAICOS ISLANDS

By THEODOOR DE BOOY

INTRODUCTION

THE Caicos islands, originally a part of the Bahamas and governed from Nassau, but now having a more independent system of government under the supervision of the Governor of Jamaica, consist of a group of islands situated about lat. 22° - 21° N. and long. $71^{\circ} 30'$ - $72^{\circ} 30'$ W. (see map, fig. 1).¹ The islands are formed of the soft coral limestone common to these regions, and consist of four large cays, four or five of medium size, and a great number of smaller ones ranging in size from one hundred square feet to a mile square. With the exception of the Seal cays, bordering the Caicos Bank on the south side, and French cay on the western limit of the bank, I have been able to find conclusive evidence of pre-Columbian habitation on a majority of the islands: some of the smaller cays of course not being included in this general statement.

Outside of a settlement called Kew, on Grand Caicos, where one can find trees (tamarind and madeira) up to about fifteen inches in diameter, the vegetation on the Caicos islands is extremely small. The coppices never exceed ten feet, and usually are not more than six feet high, and, as throughout the Bahamas, cacti form the prevailing undergrowth. Of this latter variety of the Caicos flora I have occasion to speak feelingly, as one day, while about to pick up a fragment of Lucayan pottery, I fell into a "prickly pear" and it took me the better part of a day to extract the spines. The negro inhabitants grow a little corn on their clearings, and this, together with sweet potatoes and yams, affords their principal food supply. Need I say that the destitution, want, and squalor on some of the islands are beyond imagination?

In spite of the poverty nowadays, one can still see the remains

¹ Geographically speaking, the Caicos and the Turks islands are always included in the Bahamas.

of former greatness in many places. Before the liberation of the slaves throughout the British West Indies in, I believe, 1838, several large and rich cotton plantations were in existence on these islands. From all accounts (and a negro has a very good memory when it comes to traditions that are handed down to him by his father or



FIG. 1.— Map of Caicos Bank.

grandfather) some of the plantations on Grand Caicos had as many as seven hundred slaves, and I have seen slave quarters, built of solid stone masonry, that could accommodate fully half this number. As mention will be made of the plantations more than once in these pages, I shall not now enlarge on the subject.

At one time the northern side of the Caicos group was a favorite resort for pirates and freebooters. Evidence is not wanting that the various inlets dividing the cays were much deeper in those days, allowing a vessel of twelve-foot draft to pass through them, the small creeks making excellent drydocks in which to overhaul and calk the piratical craft. On the former McIntosh plantation at Bellevue, on Grand Caicos, I came across some fortified terraces overlooking the Lorimer inlet, which, report said, served the purpose of defending the planters in case a landing was planned by the dreaded pirates. One can talk to a Caicos negro for hardly half an hour without hearing some reference made to buried treasure, of which the blacks always seem to know the whereabouts, but which they never attempt to excavate.

A few words may not be amiss about the Caicos Bank. The boundaries of the islands on the bank side, as shown on the charts, are extremely inaccurate, only the general outline of the group being given the true position. This probably is owing to the lack of deep water on the bank proper, which makes it of no interest to the mariner. Inter-island navigation is extremely puzzling, and should never be attempted without the guidance of some competent local pilot: at that, it is not safe to sail by night, as the Caicos Bank has many dangerous shoals which cannot be observed until one is almost on top of them. In going from cay to cay on the northern side (if one has a staunch craft) it is far better to stand outside the reef in good weather, as this does away with the possibility of grounding one's vessel in shoal water and having to wait eight hours for the tide to get released.

Plug tobacco (purchased at the stores on South Caicos) will be found an excellent medium for purchase and barter throughout the cays. I have been able to purchase foodstuffs, curios, the services of laborers and guides, etc., far better with a few plugs of tobacco and some pennies, than I could have done with money of large denomination.

THE ANCIENT INHABITANTS

When Columbus first set foot within the New World, it was upon one of the Bahama islands, called Guanahané by the natives whom

he found there. This island Columbus named San Salvador, and it is still known by this name and also by the name Watlings island on British charts. Columbus afterward proceeded to Little and Large Exuma, and on all these visits his accounts of the natives (or Indians as he called them) are the same. Although these people, from all accounts, called themselves Ciboneys, they later received the name "Lucayans," and, as they are generally thus designated, I shall employ the same term.

From the accounts Columbus gave, the Lucayans appeared to be a gentle, peaceable race, unskilled in warfare, possessing no offensive weapons, and of an extremely tractable disposition. They treated Columbus and his followers with the utmost respect and deference, showed as much hospitality as they were able, and did their utmost to welcome the "visitors from Heaven," as they fondly imagined the white men to be.

It is evident that the Lucayans were mostly agriculturists. Acosta, in his history of the Indies, mentions the fact that the Lucayans made cassava bread from both the poisonous and the non-poisonous variety of the yucca, which were cultivated in the fields; and this bread, together with iguanas, fish, and fruit, formed their principal diet. Whether or not in those days large animals existed on these islands is a matter for conjecture: the fact remains that, outside of cattle, swine, horses, and donkeys which have been introduced on the Bahamas by white men, no indigenous mammals now exist, and did not exist in pre-Columbian times, with the exception of a species of dog that never barked and a kind of coney, or rabbit, called *utia* by the natives. And still, I have found more than one vertebra of some large mammal amongst Lucayan material in caves, and also the fang of a boar, which probably had been used for incising pottery, of which mention will be made later. Now, whether or not these bones were brought by the Lucayans from other regions to the Bahamas is a problem I can not solve. Outside of the cultivation of yucca and fruit, the natives also must have grown cotton, as is evident from the fact that Columbus in his diary mentions their bringing balls of cotton for barter and that this seemed to be their most valued possession. Also

they made their "hamackas" (hammocks) of cotton, and it would seem that for this latter invention alone the Lucayans have a claim on posterity.

It was erroneously supposed by Columbus that the Lucayans made a practice of anthropophagy, because, on exploring the huts in which the natives lived, his sailors found dried human remains, such as arms and legs. It was later proved that these were kept from reverential motives and belonged to the ancestors of the occupant of the hut.

The Lucayans were a very cleanly people, taking a swim after each meal, which practice apparently did not produce any ill effect. Also their houses were kept in a remarkable state of cleanliness.

From the skeletal remains that have been found in various parts of the Bahamas, it appears that the Lucayans were of normal height and development, excepting the skull, which, like that of the Flathead Indians of our Northwest, the Aymara of Lake Titicaca, and some other tribes, was artificially flattened in infancy, giving the forehead a very broad appearance. Columbus notes this peculiarity in his diary, and I have observed that this sloping forehead is depicted on the small heads belonging to the rims of earthenware bowls which I have found. Columbus also makes special mention of the handsome appearance of both the men and the women: their skin was copper-colored and their features were extremely regular. The Lucayans were wont to go about naked, the men wearing a headdress of feathers, and some of the women occasionally wearing a small mantle of cotton fiber. It also seemed to be customary for the men to paint their faces to a slight extent.

The dwellings were constructed of branches of trees and interwoven palm leaves, and were built upon some sort of foundation made of coral rock. I have found many of these foundations on the islands. The earth with which they must have been covered has of course disappeared, but I could still find the fragments of pottery and other utensils in great abundance among the stones.

The Lucayans were governed by caciques, who, it seems, were elected by the different tribes, a person being chosen who was exceptionally proficient in feats of strength and endurance. Al-

though this office was not hereditary, the cacique frequently managed to secure the election of one of his sons when he himself became too old to hold office. While monogamy was practised by the Lucayans and their standard of morality was of a fairly high order, the cacique as a rule had several wives, probably owing to his position in the tribe. In this case, however, one of his wives was the principal, and the others appear to have been her helpers more than anything else.

While it is difficult to state exactly what form of religion the Lucayans had, I believe it may safely be assumed that it was the same as that of the other Arawak tribes, some of which still survive in British Guiana. These tribes believe in good and bad spirits; the latter, called *kenaimas*, being responsible for all evil influence, which the *peaiman*, the tribal priest and medicine-man, was instrumental in warding off. The Arawak also believe in a soul, which, they explain, flies away at the time of death, for then they can no longer see the reflection of a person in the pupil of the eye. The *zemes* were inferior deities, acting as messengers for the priests to the omnipotent being inhabiting the sky, in which the natives firmly believed. The caciques kept images of these *zemes* in their huts, and it was no unusual thing for the Lucayans to paint representations of these inferior deities on their bodies at certain festivals.

From the fragments of pottery which I have found, the Lucayans must have reached a high degree of proficiency in the ceramic art. Karl von den Steinen, the eminent German ethnologist, classes the Arawak tribes under the heading "potter-tribes," and this name is particularly appropriate to the Lucayans. Although none of the pottery that I have found is glazed, and none of it is ornamented with coloring, in general outline (and I can only conjecture the shapes, as I was not able to find other than fragmentary pieces) it must have been especially graceful, and the small heads, fastened to the rims of the vessels and probably serving as handles, show a clearness of outline and detail that compares favorably with more modern objects of art. Mention of these pottery fragments will be made later, and some of the illustrations give examples of incised and impressed ornamentation.

In addition to their high development in ceramics, the implements of the Lucayan people show graceful outlines, some of the jadeite chisels particularly being extremely symmetrical in shape. As builders of canoes, also, the Lucayans had few equals: some of these craft seated as many as a hundred people, and the fact that long trips were made in them proves conclusively that they were seaworthy. Another example of the artistic ability of this people is found in the carved stools of quadruped form used by the caciques, one of which is to be found in the United States National Museum at Washington. Navarrete makes mention of these in his *Primer Viage de Colon*.

I have found a great deal of evidence that the Lucayans inhabited many of the caves with which the Bahamas abound. I am inclined to believe that these caves were used primarily as places of worship and secondarily as shelters during hurricanes, and that it was not until the persecution by the Spaniards commenced that the Lucayans began to employ them as permanent abodes. Frequently the mouths of these caves are very hard to find, owing to the dense undergrowth, consequently they would make ideal places of refuge.

It is estimated that when Columbus discovered the Bahamas, the Lucayans numbered about forty thousand souls. Is it not shameful to contemplate that, a quarter of a century after these people first made the white visitors welcome to their islands, not one of them was left to speak of the change the Spanish rule had made in their former peaceful existence? Before dwelling on their extermination by the Spaniards, a few words will not be amiss regarding the origin of the Lucayans.

The Arawak previously mentioned are generally supposed to have come from the Matto Grosso region in the interior of Brazil. It is from this people that the Lucayans originated, after the parent group had migrated from Matto Grosso to the interior and the coast of British Guiana. While it is impossible to make any positive statement, I imagine that it was due to the constant persecution which the peaceful Arawak had to endure from the warlike Caribs that some of the tribes detached themselves and

gradually settled farther north on the Greater and the Lesser Antilles.¹ And even here it seems that they were not safe from oppression by the Caribs, but were forced to journey farther and farther northward until some of the tribes finally settled on the Bahama islands.² These then were afterward known as the Lucayans. It is hardly to be believed that this occupancy had been of long duration, for we find that at this time the Caribs were already taking possession of Haiti and waging fierce war on the Arawak tribes living on that island. What conclusion can be more obvious than that the Caribs soon would have crossed over to the more northerly islands in their canoes and have commenced the extermination of the Lucayans that was afterward completed by the Spaniards? And from the fact that the island of Haiti is far richer, more fertile, and better watered than the Bahamas, I believe that the Lucayans settled on the Bahamas only after the Caribs came to Haiti, which event can have been but a short time before the discovery by Columbus.

How the inhabitants fared after the Spaniards took possession of the West Indies is a matter of general knowledge. At first forced to pay a tribute or tax, afterward made to serve as laborers for a certain time, and finally kept in absolute bondage, a people accustomed to spend the greater part of their time in hammocks and working only when it was necessary to cultivate their scanty crops, would, as a matter of course, become speedily exterminated under the stern Spanish rule. The bondage was called the *encomienda*, "protection," which gave a certain number of laborers to each of the Spanish land owners for the cultivation of crops and the working of mines. Considering the average character of the outlaws who went to the New World, it cannot be wondered that this system was a source of abuses, and that the natives, living on the *repartimientos*, or allotments, granted to the followers of Columbus,

¹ The contemporary historians of the Columbian era inform us of the discovery of some islands in the West Indies on which the men and the women spoke different languages. The explanation is simple. The Caribs, having conquered the peaceful Arawak, killed the men and kept the women as captives. This would account for the two languages spoken.

² It is now known that some of the Arawak tribes not only navigated as far north as the Bahamas, but even landed and settled in Florida.

were made to work beyond the limits of their endurance. The Arawak tribes at the best were not long-lived: Im Thurn states¹ that he never came across an Arawak exceeding forty years of age. The speedy extermination of these people, when made to do unusual work and to suffer the hardships of the Spanish rule in the West Indies, was therefore a foregone conclusion. Cases are noted in historical records in which a landowner was assigned three hundred laborers, of whom, after three months, only thirty were alive.

Naturally these practices soon made the Lucayans change their minds about the "visitors from Heaven." At first, whenever they saw a Spanish vessel anchor off their island, they would joyfully board the craft, carrying such humble presents as they were able to give, and receive in return hawk-bells and toys, which to them seemed the most wonderful celestial gifts. But when the Spaniards began to go ashore on some of these expeditions, and to capture the men and carry them off to work in the mines of Haiti, it was not long before the Lucayans dreaded the approach of a Spanish vessel and hastened to hide themselves in the caves and underbrush. Even here the natives were not safe, for, tracked by bloodhounds, they were easily captured and carried off, as they had always been peaceful and were not able to offer the slightest resistance.

This, then, is the brief history of the extermination of the Lucayans: the men captured and carried off to work in the mines and die a miserable death; the women left widowed with no men to propagate the race. There is little wonder that after a quarter of a century the Lucayans were extinct.

RESULTS OF THE EXPLORATION

ISLAND OF PROVIDENCIALES

Juba Point.—Near a cape on the southern coast of Providenciales, called Juba Point, are two caves which, according to the report of my guide and that of the other inhabitants of a small settlement called Kingston, had never before been entered by a white man, except on one occasion, when a guano prospector had

¹ Among the Indians of Guiana, London, 1883.

looked into them but had failed to find sufficient guano to make the working of the caves profitable. This was about the year 1880, since which time the caves had not been entered, as the average negro is too superstitious to enter a cave at all, unless accompanied by a white man.

Both the Juba Point caves in all probability lead to a large "ocean-hole," an enormous cavity in the coral rock communicating subterraneously with the sea. In this instance the hole was about three miles inland. Usually these holes contain fresh water which

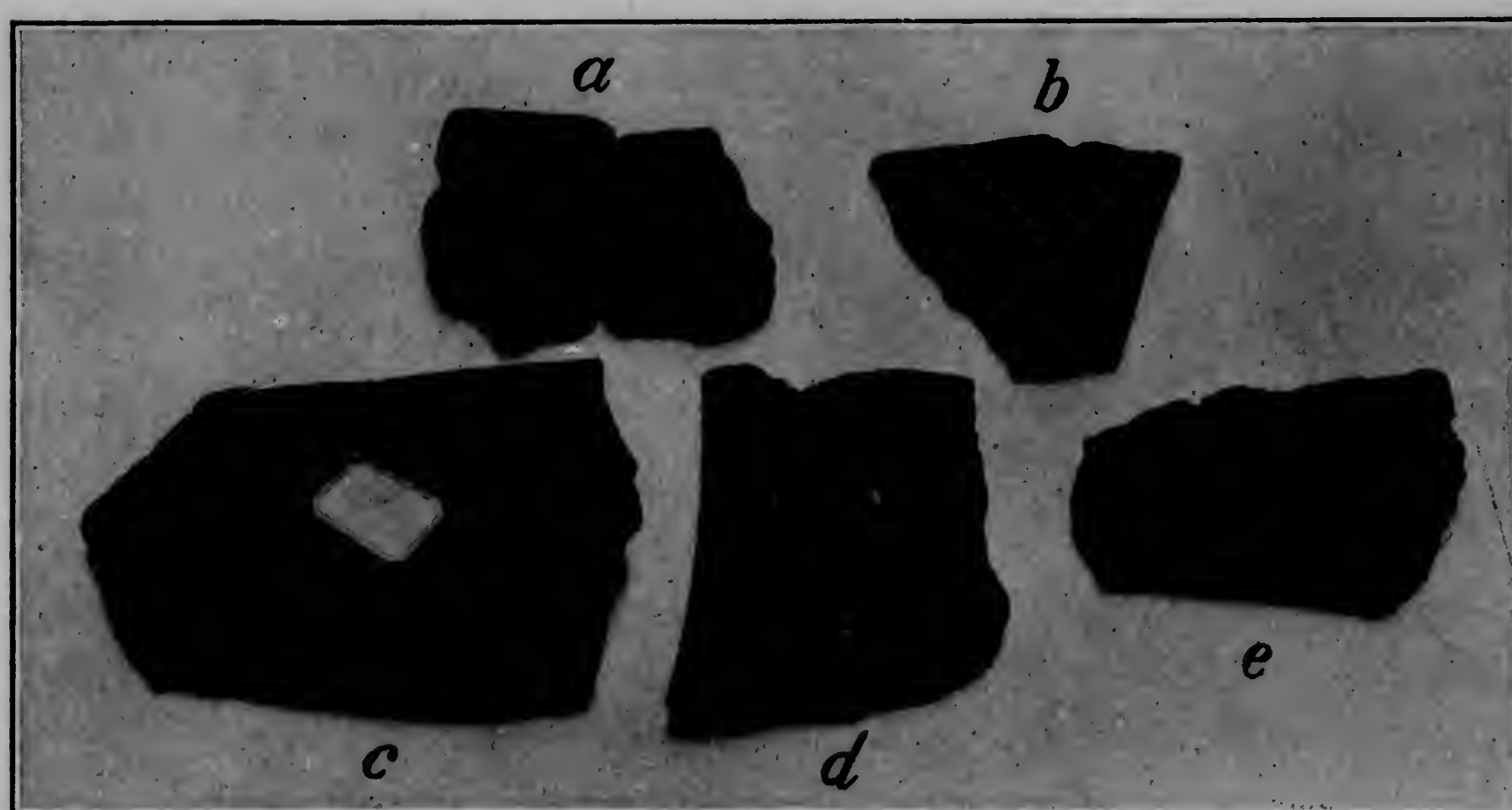


FIG. 2.—Pottery fragments.

risers and falls with the tides. The hole mentioned is fully 100 feet in diameter and about 30 feet deep, while the caves are situated within 200 feet of it.

The mouth of the first cave is about three feet in diameter; the shaft of the cave, ten feet in length, slopes downward at an angle of about 45 degrees and leads into a long chamber, which in turn branches off into two or three smaller ones of no importance. There was some guano in this cave, but careful exploration showed no signs of prehistoric habitation; this was not surprising, however, as access to the main chamber of the cave could be gained only by means of a rope.

There is a small mound outside the mouth of this cave, on which I found a small fragment of incised pottery (fig. 2, e).

The second cave has a larger mouth, about ten feet in diameter, a very gradually downward-sloping shaft fully seven feet wide, leading into a large main chamber with two branches, in all probability communicating with the ocean-hole. This main chamber is readily accessible, but unfortunately a great deal of limestone had fallen from the roof of the cave and had covered the floor.

There can be no doubt, however, that this cave was once inhabited, as excavation produced several pieces of charred wood, a few turtle and other bones, some fragments of pottery, and a small jadeite hatchet (fig. 3, c). This implement was found, together with some burned wood and two or three conch-shells, beneath about eighteen inches of cave-earth. The majority of the potsherds were

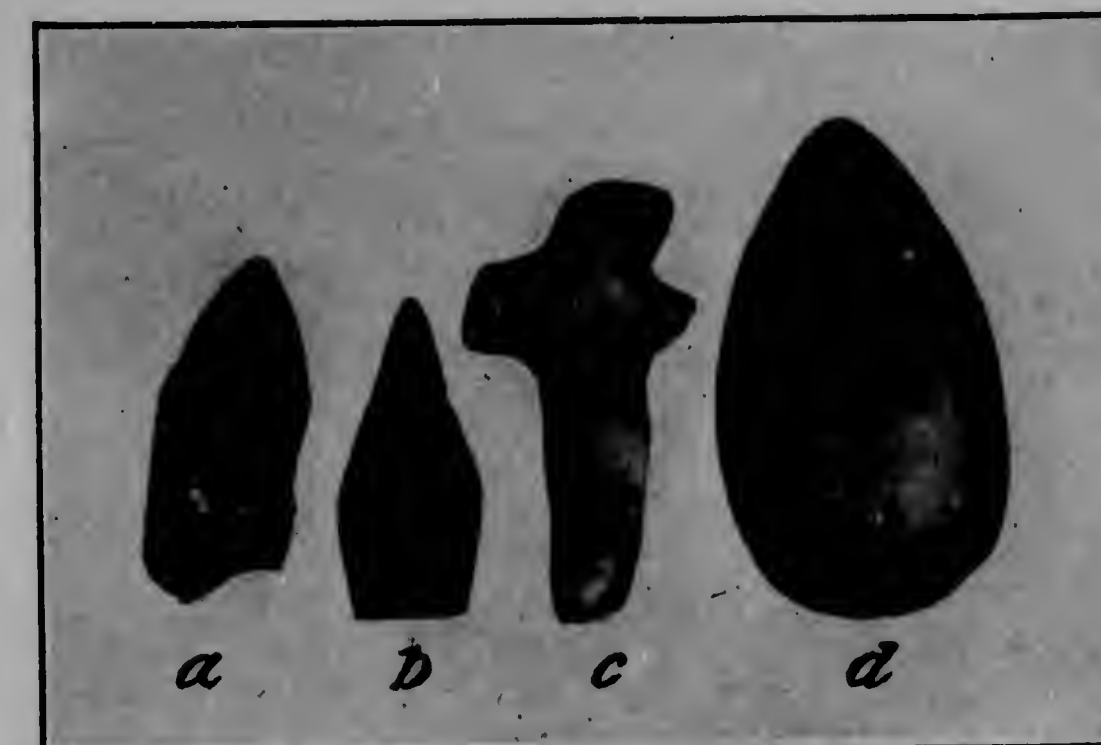


FIG. 3.—Stone implements.

of plain ware, but three fragments show ornamentation by incision. One was part of the rim of a large bowl of light reddish-brown clay, decorated with simple straight lines; fig. 4 shows a similar fragment, of dark-brown clay, with straight line incisions and circular impressions; while the third was a fragment of a vessel of dark-

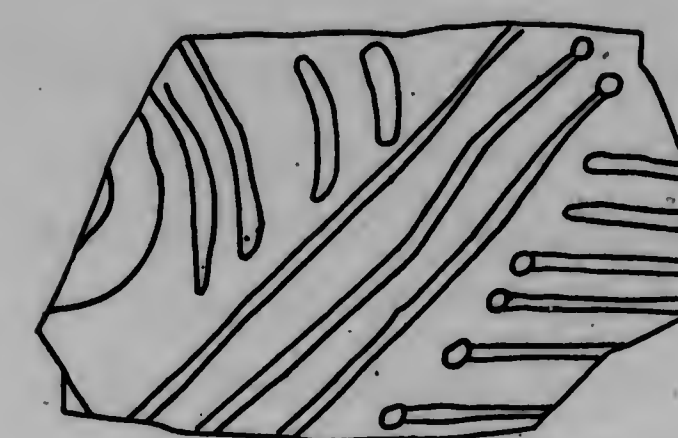


FIG. 4.—Fragment of incised pottery.

gray clay, ornamented with circular impressions. Like the other material found, these sherds, as well as several unornamented ones, were found beneath earth and pieces of limestone coral.

West Harbour Bluff.—West Harbour bluff is a cape on the southwestern point of Providenciales, and an open cave is found on the western side of the bluff. This cave is practically open, with two

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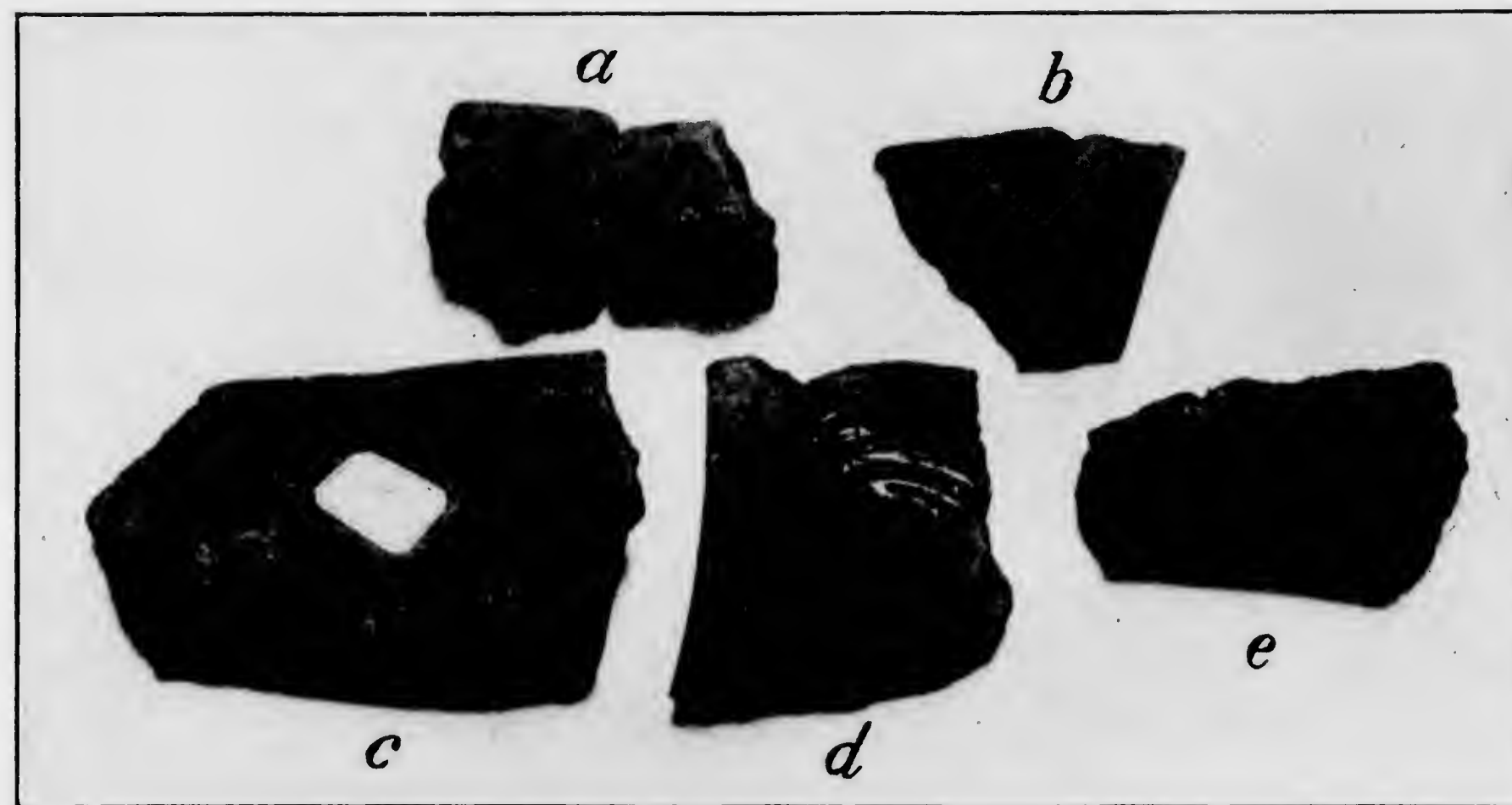


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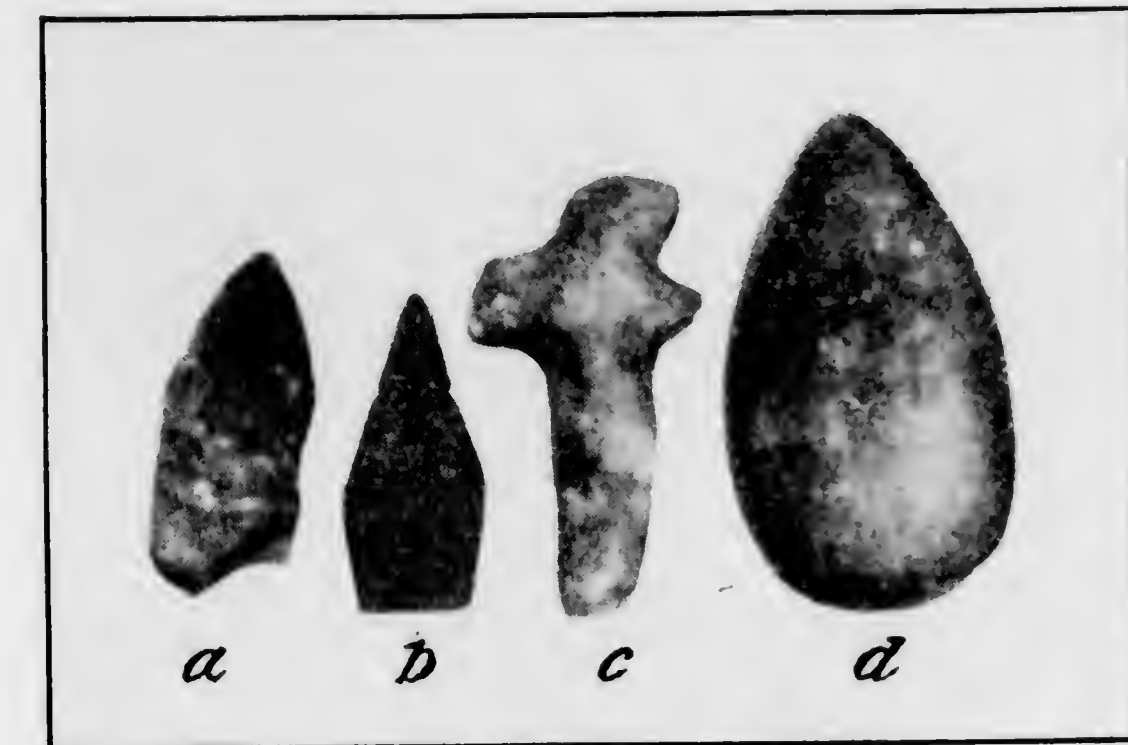


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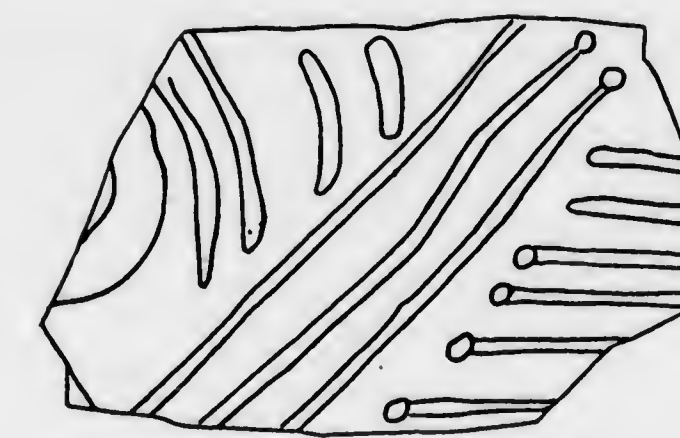


FIG. 4.—Fragment of incised pottery.

of plain ware, but three fragments show ornamentation by incision. One was part of the rim of a large bowl of light reddish-brown clay, decorated with simple straight lines; fig. 4 shows a similar fragment, of dark-brown clay, with straight line incisions and circular impressions; while the third was a fragment of a vessel of dark-gray clay, ornamented with circular impressions. Like the other material found, these sherds, as well as several unornamented ones, were found beneath earth and pieces of limestone coral.

West Harbour Bluff.—West Harbour bluff is a cape on the southwestern point of Providenciales, and an open cave is found on the western side of the bluff. This cave is practically open, with two

small protected chambers under the rock. A stretch of beach about twenty feet long leads from the cave to the sea. I found many conch-shells grown in the rocks between the cave and the beach, and this in itself is a sign of Lucayan occupancy. One can always tell a conch-shell opened by a Lucayan, from a more modern one opened by a negro, as the opening by means of which the conch is extracted from the shell is of a different shape and in a different location in the two cases.

The bottom of one of the two chambers in this cave was covered with "cave-earth," and, as throughout these pages mention will be made of this substance, it may be well to explain what it is. Throughout the Bahama islands are a great many coral limestone caves, and in the majority of these is found a species of earth, varying from light gray to dark brown in color, rich in phosphoric acid but containing practically no ammonia. Although this cave-earth is generally spoken of as "guano," from the fact that it contains such a small amount of ammonia it is hardly conceivable that the substance really is excrement, although the natives would have one believe that the bats (of which usually there is a great abundance in the caves) are responsible for the deposits. The cave-earth is deposited on the floor of the caves and in places exceeds four feet in depth.

I commenced excavation in the small chamber, the floor of which was covered with this cave-earth. This was in a rather deep layer, and the material found was practically at the bottom on ground rock. The following objects were found:

Several bones and bone implements, among which were a hoe fashioned out of a turtle-bone; three awls; one or two smaller, pointed bones probably used for ornamenting pottery, and the fang of a boar, probably employed for the same purpose. I also found about ten sherds of unornamented pottery, and three decorated fragments. Fig. 2, *d*, shows a sherd of brown clay with incised and impressed circular ornamentation. Fragment *b* of the same illustration is a part of the rim of a bowl of dark-brown ware and is decorated with incised straight lines. The third incised sherd is too small to be of special interest.

In addition to these fragments, I found a small head (fig. 5, *a*) which evidently had been part of a bowl. It is of light-brown clay, and it is noteworthy that the sloping Lucayan forehead is clearly indicated. I have noticed this peculiarity in all the other heads I have been able to find.

Indian Hill (Malcolm Roads).—From reports given me, I have every reason to believe that one could find a great deal of Lucayan material in the vicinity of the "Indian Hill" near the Malcolm Roads on the western coast of Providenciales. At the time I had no opportunity of going there, but as the Caicos negro

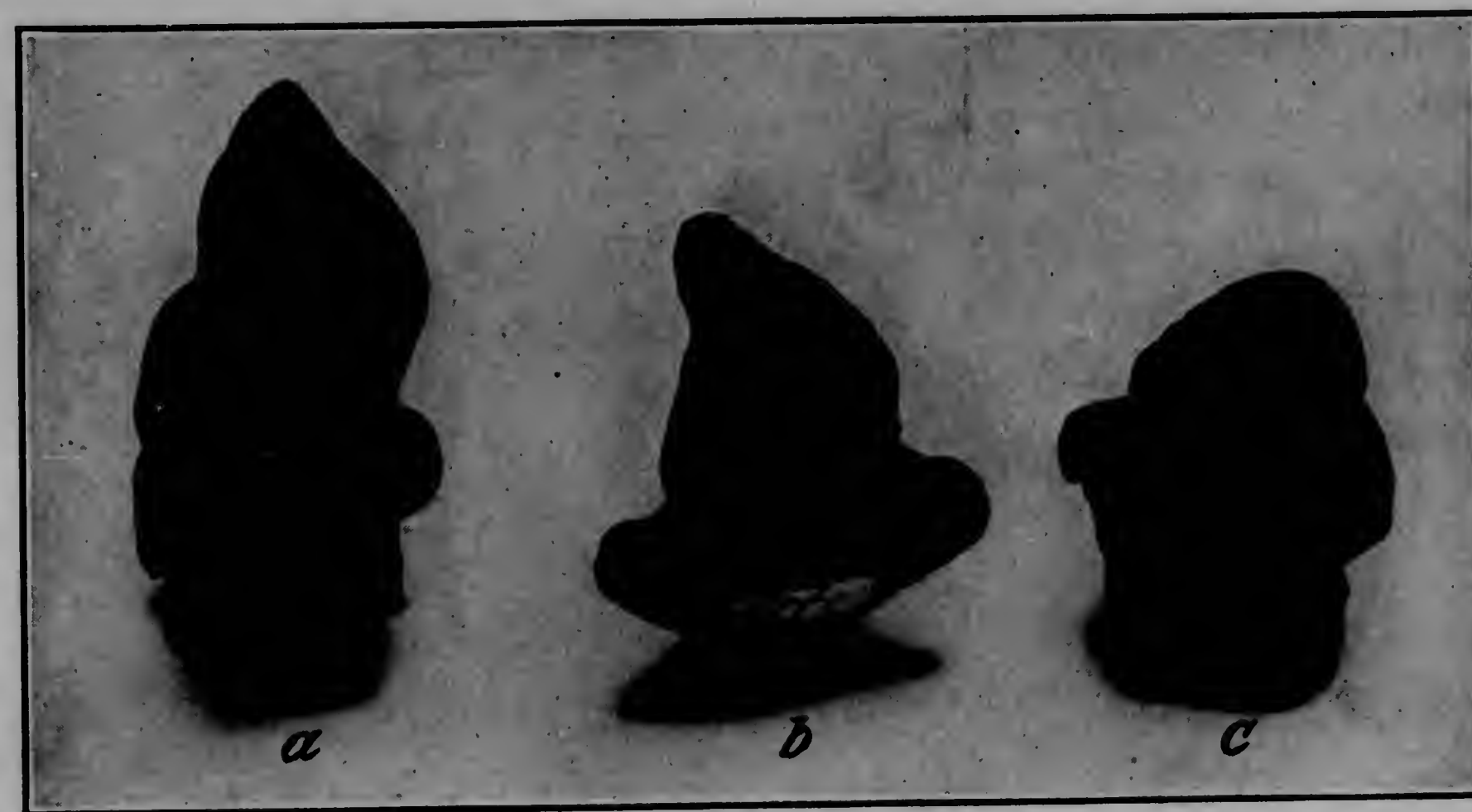


FIG. 5.—Pottery heads.

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Blue Hills.—As in the case of "Indian Hill," I was told of the finding of stone implements, or "thunderbolts" as the negroes call them, in the neighborhood of a colored settlement called Blue Hills, on the northern coast of Providenciales.

THE AMBERGRIS CAYS

Ambergris Cay.—As at Juba Point on Providenciales, there is a large ocean-hole about a mile inland from the southern coast of Ambergris cay, and about six small caves from which underground

small protected chambers under the rock. A stretch of beach about twenty feet long leads from the cave to the sea. I found many conch-shells grown in the rocks between the cave and the beach, and this in itself is a sign of Lucayan occupancy. One can always tell a conch-shell opened by a Lucayan, from a more modern one opened by a negro, as the opening by means of which the conch is extracted from the shell is of a different shape and in a different location in the two cases.

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THE AMBERGRIS CAYS

Ambergris Cay.—As at Juba Point on Providenciales, there is a large ocean-hole about a mile inland from the southern coast of Ambergris cay, and about six small caves from which underground

passages lead to the hole. These passages, however, are closed, and the only trace of Lucayan habitation that I could find was a conch-shell in the mouth of one of the caves. It is strange that no other traces on the entire island (which is about four miles long and three miles wide) could be found, as it is fairly fertile, has a good beach on the southern and eastern coasts, and would seem to be directly in the track of inter-island navigation. The caves are all small and difficult of access. I could find no mounds on the island, neither on the hills nor on the salina flats.

Little Ambergris Cay.—A small sandy cay with excellent well-water and quite a large cocoanut grove, but no traces of previous habitation.

Fish Cays.—Three small rocky cays over which the sea breaks continually in bad weather. Landing here was no easy matter, and had to be given up after one or two attempts, as the sea was running too high. It seems to me doubtful, however, whether or not I should have found any evidence of aboriginal occupancy, as even in calm weather landing must have been difficult.

NORTH CAICOS ISLAND

Sandy Point.—Sandy Point is on the northwestern coast of North Caicos, between Parrot cay and St Mary cays. On the old



FIG. 6.—Pottery fragment showing handle.

St James property (which a hundred years ago must have been a splendid cotton plantation and on which one may still see the ruins of a magnificent house and driveway) I found one cave with two mouths, both of which lead into the main chamber. Here I found the usual deposit of cave-earth on the floor, and on excavating in one or two places, directly under a spot where the roof of the cave was smoked as if cooking had been done there at one time, I found one or two bones (presumably of a large green turtle), one sherd of incised pottery, five or six sherds of unornamented pottery, one brown flint hatchet-head, and one highly polished black flint chisel with cut-

ting-edge. This chisel is one of the most symmetrical and beautiful prehistoric stone implements known to me. The pottery fragment is part of a reddish-brown clay bowl with one of the lugs, or handles, attached.

It is to be regretted that on the Caicos islands, owing to the climatic conditions and to the rocky soil, pottery and other prehistoric objects have so slender a chance of being preserved in their entirety.

Pumpkin Bluff.—This bluff lies between Sandy Point and the mouth of Bottle creek (of which mention will be made later) on the north coast of North Caicos. Some 50 yards due east of the bluff



FIG. 7.—Fragment of Lucayan bowl.

proper is a cave with a single chamber, where I succeeded in finding an exceptionally fine fragment of a bowl of light-brown clay. The diameter of this vessel was about ten inches, and the bowl cannot have been more than one inch high (fig. 7). The forehead of the small head, as usual, has a perceptible slope. I also found the usual turtle and other bones, and a few unornamented pottery fragments. All this material, as usual, was covered with a heavy deposit of cave-earth. The rest of the cave had been filled with a considerable amount of sea-sand which must have washed in during northern storms.

Whitby.—This settlement derives its name from the old plantation in the vicinity, the ruins of which may still be seen. I could

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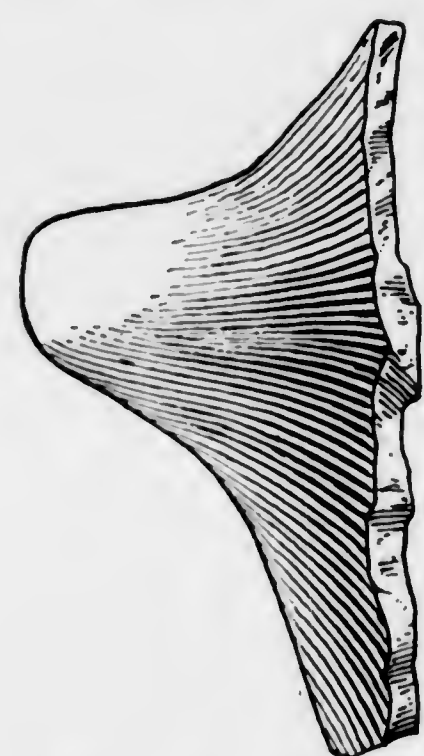


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find no trace here of Lucayan occupancy, although I heard afterward that some of the natives knew of a field in the neighborhood where potsherds had been found. I had no time then to return, but succeeded in obtaining a fairly good specimen of Indian imple-



FIG. 8.—Clearing at "Mountain".

ment, made of jadeite and quite well polished. Whitby lies about a quarter of a mile inland and one mile east of Pumpkin Bluff.

Bottle Creek.—Bottle creek is a sea inlet dividing North Caicos from Grand Caicos. The creek proper has several settlements on it, all on the west side, and allows a vessel drawing not more than three feet of water to enter through the northern mouth. The southern mouth, however, leading to the Caicos Bank, is fit for small row-boats only, and even then only at high water. Bottle creek at one time was a favorite location for large plantations, and there still are many negro settlements along its banks which derive their names from these. Many of the old plantations show traces of having been fortified against pirates, which at one time were plentiful along the northern coast of the Caicos islands and which used Bottle Creek inlet (in those days considerably deeper than now) as a convenient place for overhauling their craft.

The most northerly settlement, called Bellevue, consists of the

old McIntosh and Mountain plantations. The former place is about six miles from the northern coast, and the Mountain plantation is situated two miles inland, communicating by means of a carriage road with Bellevue proper. On "Mountain," the original clearing of the Lucayans can still be plainly seen (fig. 8). There are several mounds on these clearings, on which evidently the original inhabitants built their huts and shelter places. The sand with which the stones of these mounds must have been covered has of course been blown away, but one can still find many indications, such as broken cooking utensils, ashes, and animal-bones, that these mounds were used for no other purpose. In the mound shown in fig. 9 I found four fragments of pottery with ornamentation, seventeen fragments of plain pottery, and one hammer-head. Fig. 2, *c*, shows part of the rim of a vessel of brown clay with incised decoration. Fig. 10 shows part of the incurving rim of a dark-gray bowl



FIG. 9.—Excavating a mound.

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I heard many reports of other findings on the range of hills west of Bellevue, and believe there can be no doubt that these hills were extensively used as a camping-ground by the Lucayans. Caves are found in great numbers on North Caicos, and with time and sufficient means, many important finds could be made in this neighborhood.

Another settlement, called Windsor, on Bottle creek, lies about a mile south of Bellevue. Two miles inland from this place I found another Lucayan clearing, but succeeded in finding only two ornamented sherds, both with diagonal incisions, and about eight fragments of plain earthenware. This clearing was on a hill, called Tommy Hill by the negroes, and one negress told me of finding a practically entire pot there at one time. She had, unfortunately,

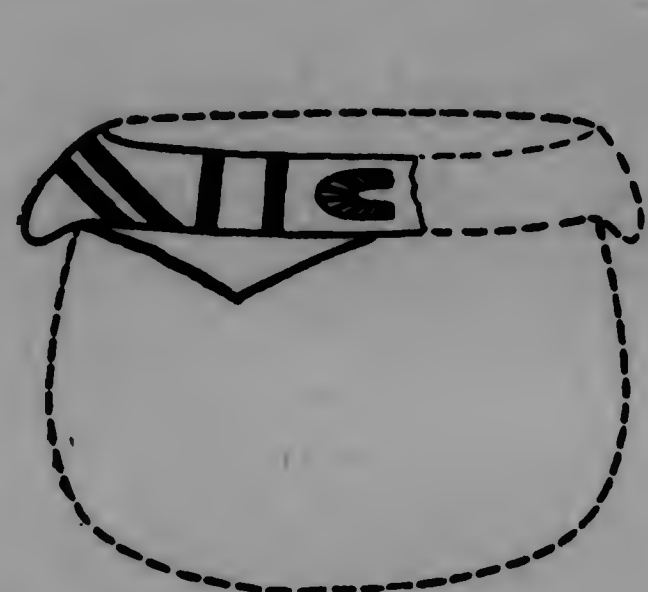


FIG. 10.—Fragment of rim of vessel.

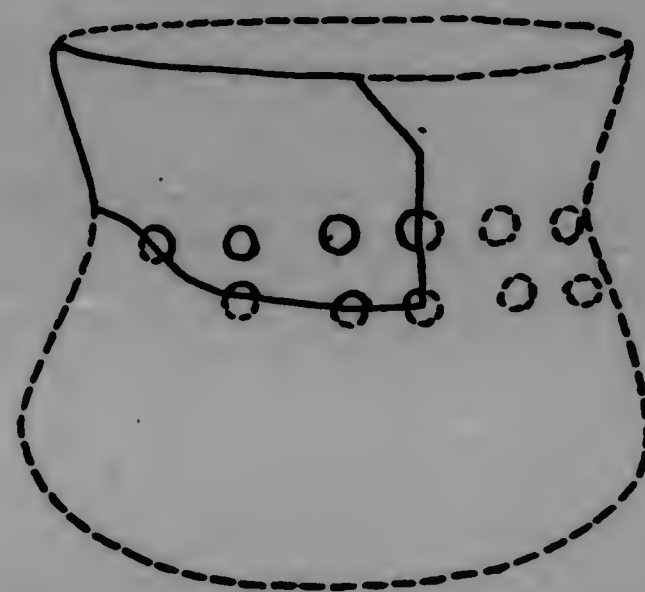
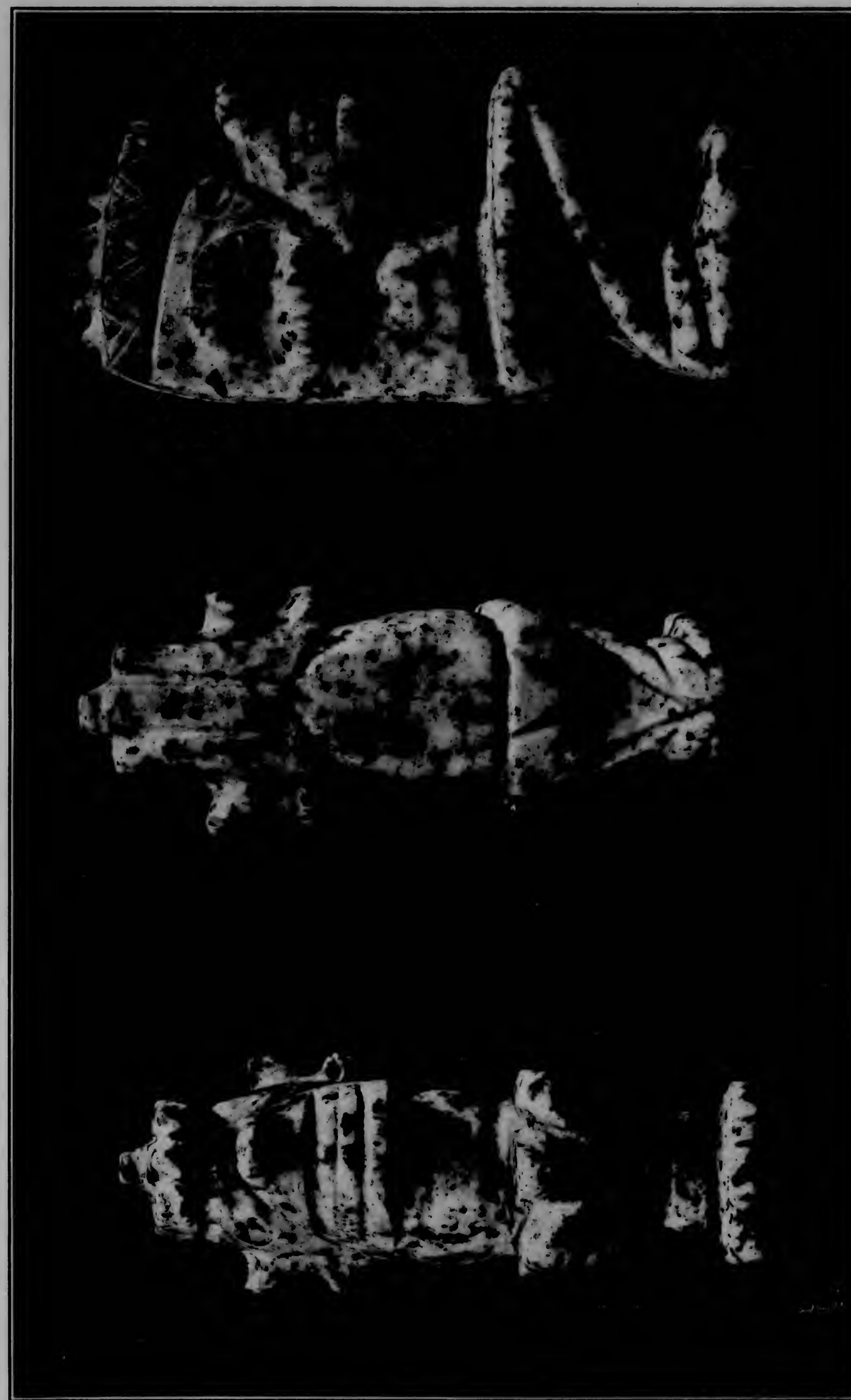


FIG. 11.—Fragment of rim and neck.

given this to her baby to play with, of course with the result that by the time I came it could no longer be found. I have noted throughout the Caicos islands that the present inhabitants take absolutely no interest in their predecessors, and beyond valuing the occasional stone implement they find as a preventive against thunder and lightning, of which they are mortally afraid, they attach no value whatsoever to any specimen of pottery found in their fields, and indeed seem to take delight in breaking up every piece they come across.

I heard further reports of pottery and implements found on the range of hills back of Bellevue and Windsor, particularly in the neighborhood of two settlements called Ready Money and Lockland. The negroes never go inland, as their fields are all within a



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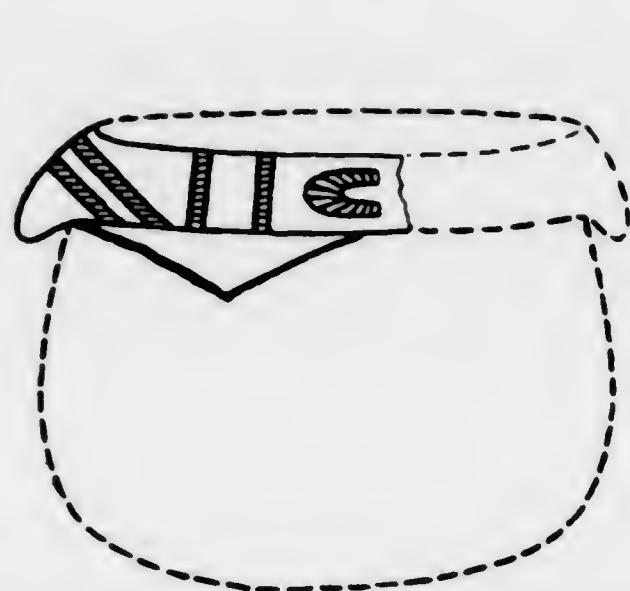


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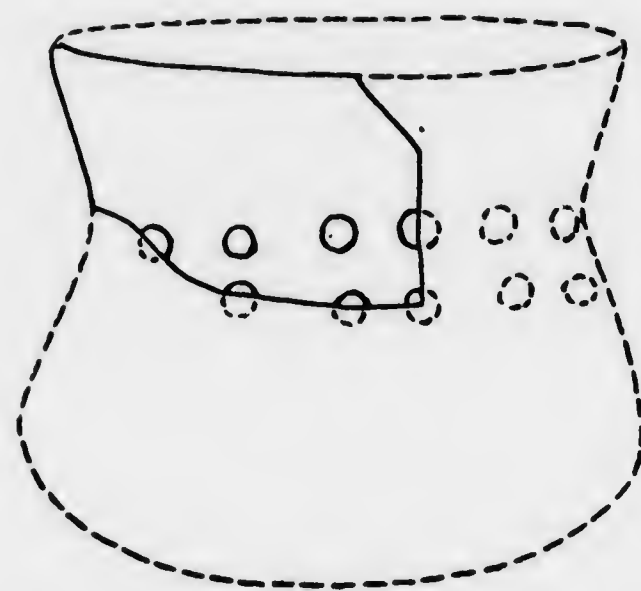
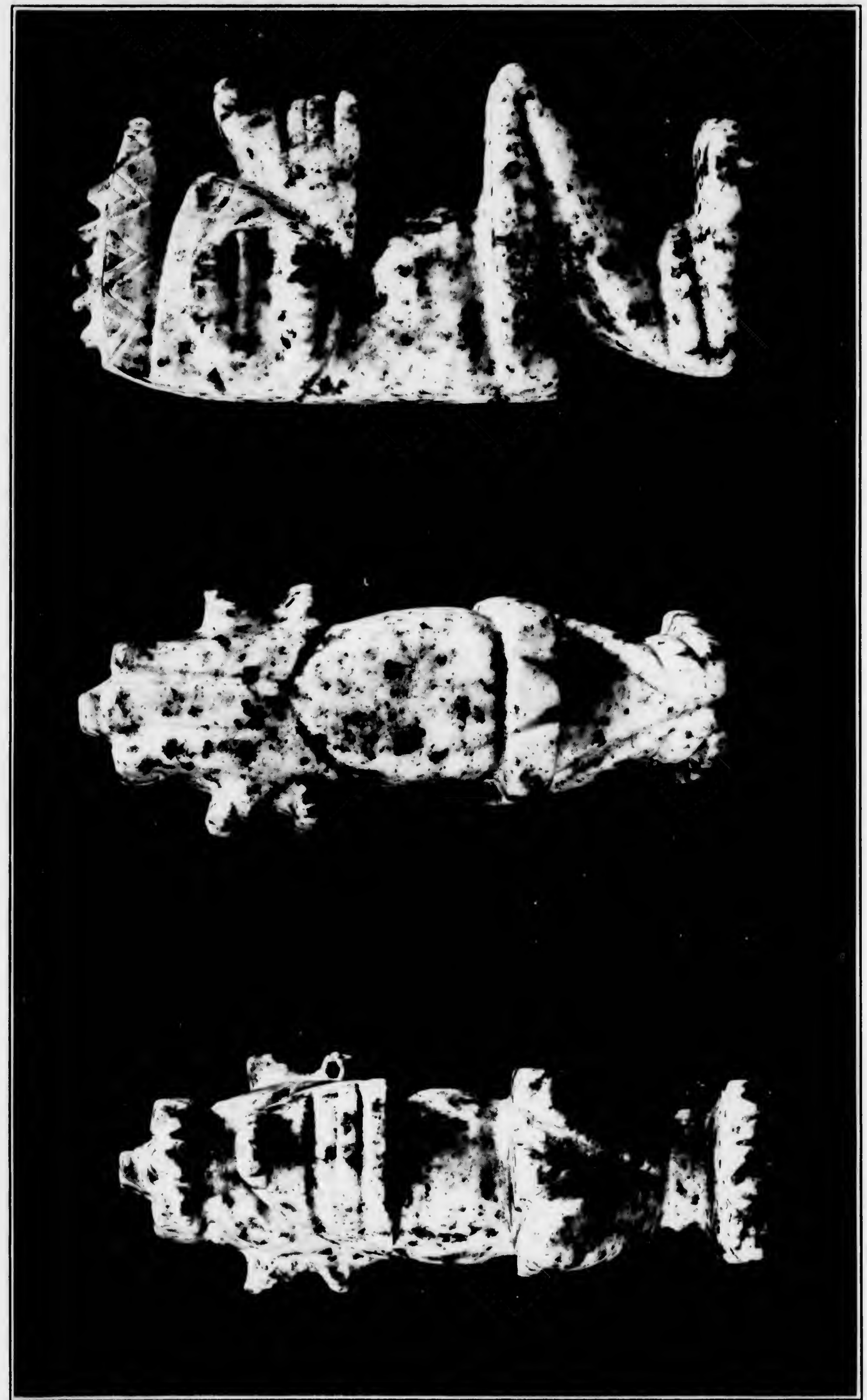


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mile of Bottle creek and their fish is obtained from the sea; consequently, beyond speaking of caves (which they firmly believe are haunted) and mounds, they know nothing about the interior of North Caicos. The only settlement in the interior is called Kew, formerly the seat of government of the Caicos islands, with the ruins of official buildings, a large sugar-factory, and several plantations.

Kew.—As mentioned before, Kew is the most fertile spot on the Caicos islands, and the only place where one may find trees of any considerable size. The settlement consists of about fifty houses, with 300 inhabitants, the latter subsisting on corn and sweet potatoes. I could find no actual traces of Lucayan habitation around here, but acquired one fragment of a stone implement from an old negress. This implement is made of a species of dark-green jadeite, but I cannot determine to what use it was put.

Some few years ago a very interesting stone idol was found in the neighborhood of the Kew settlement. Plate VI shows three views of this idol, which I was not able to acquire, and for the photographs of which I am indebted to Mr J. S. Cameron, owner of the East Caicos sisal plantation. It is curious to note the pierced ears and the manner in which the feather headdress is represented.

Information points to the southern border of St Thomas' Hill, in the neighborhood of Sandy Point, as a likely place for finding Lucayan material; also to a place called Boston, northeast of Kew, where some caves are said to be, in the neighborhood of which several fragments of pottery have been found.

GRAND CAICOS ISLAND

Ferguson's Point.—There are two small caves at Ferguson's Point on the northern coast of Grand Caicos. These caves are easy of access, but I could find no evidence that they had been inhabited.

Conch Bar.—Conch Bar is another settlement on the northern coast of Grand Caicos, one mile west of Ferguson's Point. Here there are several caves that about thirty years ago were worked for the cave-earth they contained. It is evident that a tribe of Luca-

yans must have inhabited these regions, as I heard of several articles that had been found at the time of the guano digging. My guide told me that he knew of two small wooden stools, several skeletal remains (which were thrown away through the stupidity of the negroes), and some crude bedsteads made of forked sticks and boughs, being found there when the cave-earth was removed. The caves have been so thoroughly emptied of all the earth that was in them, leaving nothing but the bare rock, that I was able to find no material at all. These caves all have great beauty, are easy to enter, and must have been excellent shelters and dwellings, as it is no rare occurrence to find small fresh-water lakes in them. The Conch Bar caves are the largest ones on the Caicos islands and continue underground for great distances. The "Village Cave" has several mouths, and there is yet another cave close by called the "Orange Tree Cave."

From all indications I would again state that one should be able to find much material on the hills of several of the Caicos islands. While going about I continually heard of negroes finding potsherds on their occasional trips to the interior; but as I was not prepared to stay away from the coast during the night, having to sleep aboard the craft that was taking me around the islands, I could at the time not go more than four or five miles inland. With time and means it would be an easy matter to take two or three bearers and make a prolonged stay in the interior.

In the neighborhood of Conch Bar is a hill, called Dead Man's Skull Bluff, on the crest of which is another clearing. Here I found two sherds of ornamented pottery of no especial interest, and about ten fragments of plain earthenware. These fragments, together with some turtle-bones and ashes, were found in a kind of mound that was there.

Lorimers.—Lorimers is another settlement, three and a half miles inland from Big Landing on the northern coast of Grand Caicos. It is situated on Lorimers creek, dividing Grand Caicos and East Caicos, but this inlet is too shoal for navigation other than by rowboat. There is no northern mouth to Lorimers creek, as it really is only an inlet of Caicos Bank.

About four miles southwest of the Lorimer settlement, on the salina, and overgrown with guinea-grass during the greater part of the year, is found a large number of Indian mounds—not burial places as might be supposed, but evidently erected as a shelter against the water on the salina and as a foundation upon which to build huts. These mounds average three feet high, eight feet wide, and about twelve feet long, and are built of pieces of coral rock. As a rule the mounds are arranged in a crescent, with not more than six mounds in the group (fig. 12).

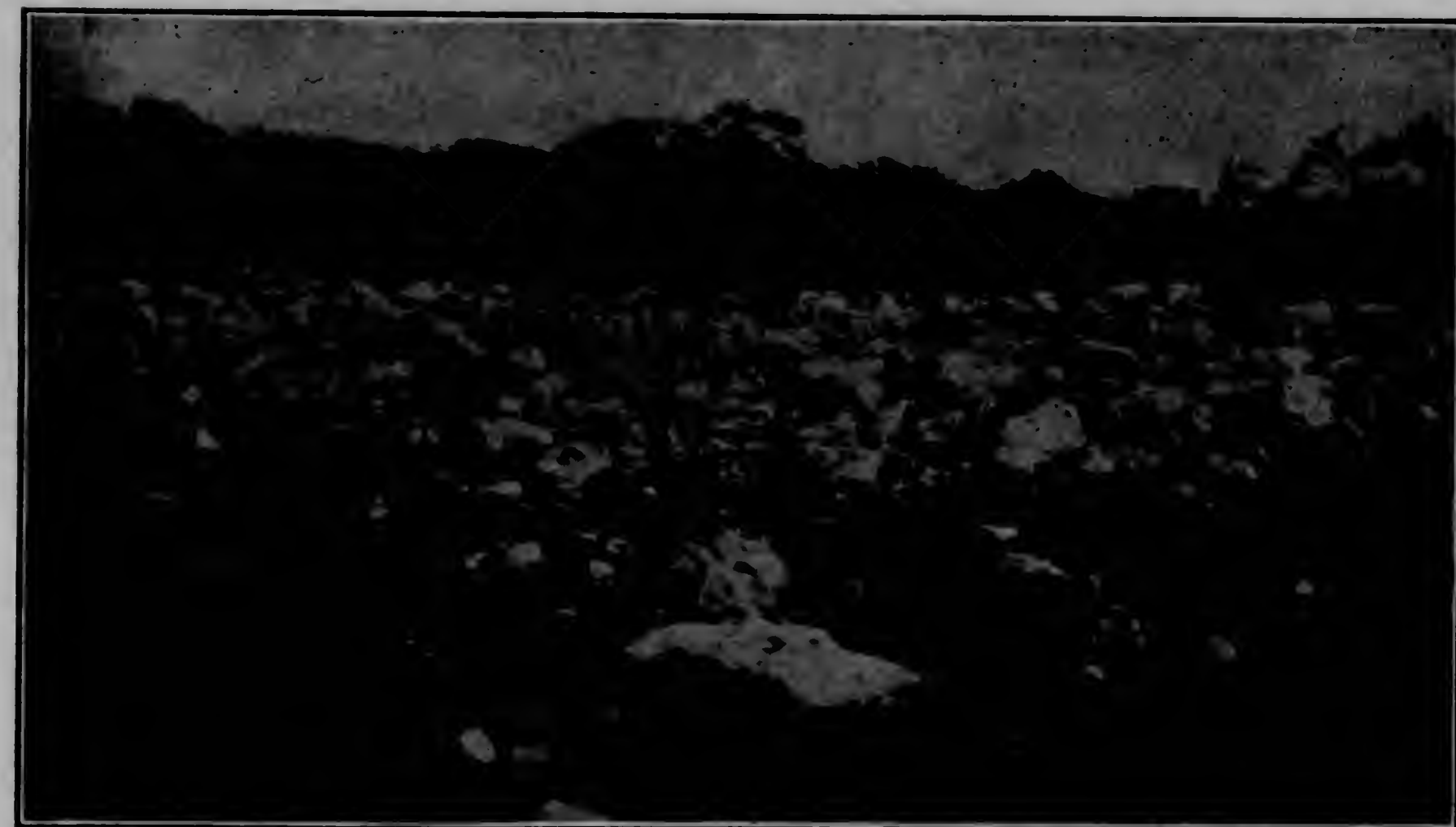


FIG. 12.—Lucayan mounds.

I found five fragments of ornamented pottery, one stone knife of very dark-green jadeite with a cutting edge and highly polished (fig. 3, *b*), and on which can be seen two small nicks by which to secure a lashing, and twelve unornamented potsherds on and around the mounds. One of these fragments is part of a large dark-brown bowl with incurving rim and impressed ornamentation. In this instance the ornamentation consists of a V-shaped figure which may or may not have been a crude effort to represent a bird (fig. 13). I have found the same type of ornamentation on other fragments at different places on the Caicos islands. Another sherd is a part of the rim of a light-brown bowl with stamped circular ornamentation (fig. 14).

In addition to these mounds on the salina flats, there are two hills, about two miles north of the Lorimer settlement, called Gamble Hill and Indian Hill. On both I found mounds, although, while there were some eight or ten on Gamble Hill, I could find only



FIG. 13.—Fragment of decorated pottery.

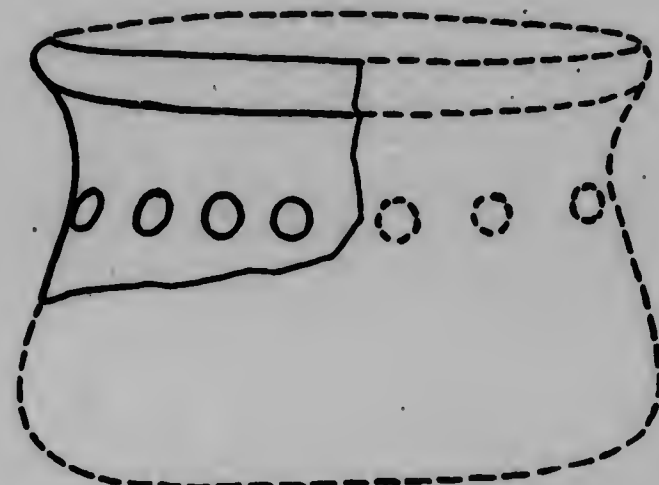


FIG. 14.—Sherd with circular decoration.

two in the brush on Indian Hill. Two ornamented sherds were found on Gamble Hill, one of which is of special interest, as the ornamentation consists of strips of clay laid over each other in regular pattern (fig. 15). I also found eight unmarked fragments here, while on Indian Hill I found three ornamented sherds and three plain fragments. These last six sherds are worthy of note as they plainly are of greater antiquity than any of the other pottery I have found on the Caicos islands, and the ornamentation of three of them is of the crudest, consisting merely of straight-line incisions without definite pattern. I also found one exceptionally large stone implement of green jadeite (fig. 3, d).

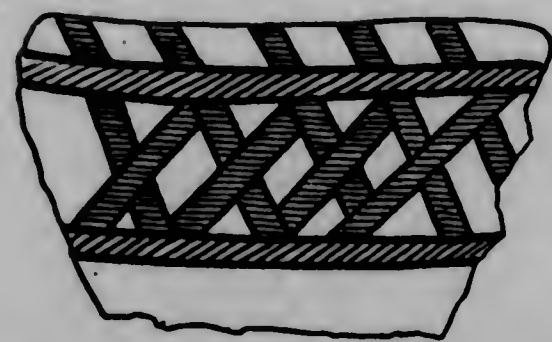


FIG. 15.—Sherd with pattern overlaid in clay.

There also are two caves within a mile of Lorimers, called Dark Night Well cave and Banana Tree cave. Although an old negro told me that he had once found an entire bowl in the Banana Tree cave, I found on going there that the mouth of the cave had fallen in and was closed, and that it would take two men an entire day to open it again. I could find no trace of previous habitation in the Dark Night Well cave.

Bambara.—This is another Grand Caicos settlement, within four miles of Lorimers. Report spoke of stone implements and pottery

fragments being found in this neighborhood, but as my time was limited I could not go there.

EAST CAICOS ISLAND

Jacksonville.—The settlement of Jacksonville, on the northern coast of East Caicos, now consists of a sisal plantation of 3,000 acres belonging to the East Caicos Sisal Company, Ltd. There are

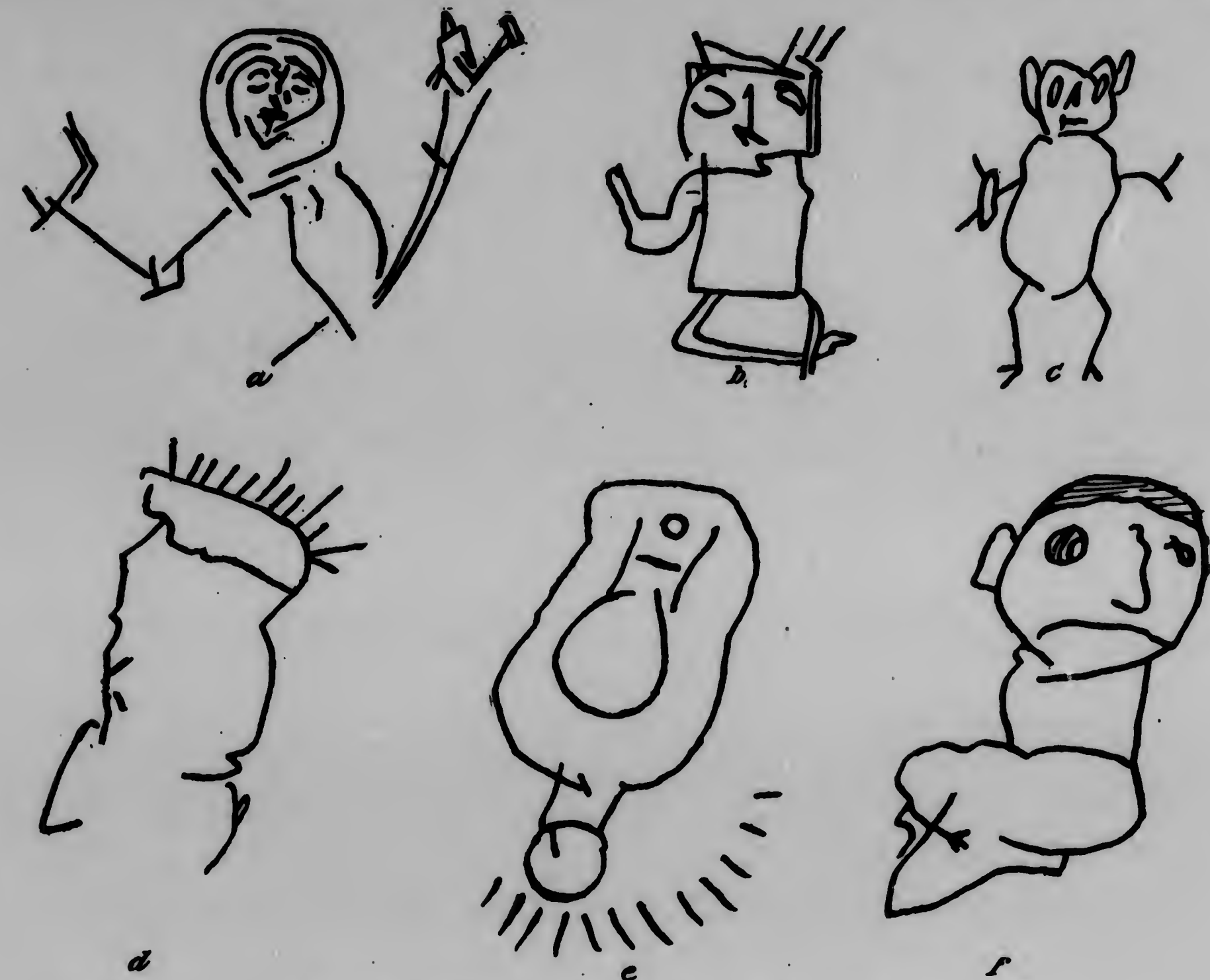


FIG. 16.—Petroglyphs in cave at Jacksonville.

several caves on this property, from which, about twenty years ago, large quantities of phosphates (cave-earth) were shipped, principally from what is known as the "Old No. 1" and the "No. 2" caves. It is said that when these excavations were commenced, several skeletons were found, also various artifacts, including a wooden stool and a platter. These two caves, however, have been so thoroughly emptied of earth that I could find nothing but bed-rock, and the same condition prevails in the "New No. 1" cave, from which also large quantities of cave-earth have been removed. It

was in this cave that I found unmistakable evidence that the main chamber had been used either as a place of worship or as a council-chamber. Various petroglyphs are found on the walls, notably those shown in the accompanying illustration (fig. 16), which are in the main chamber.

There also was a large stone in the main chamber which evidently had been cut into a rude semblance of a couch or altar; fig. 16, *d*, was cut on the roof of the cave directly over this stone. The carving of all these figures was partly obliterated, but figures *c* and *e* were most distinct. In addition to these petroglyphs there was a head, slightly larger than life-size, cut out in the rock of the main

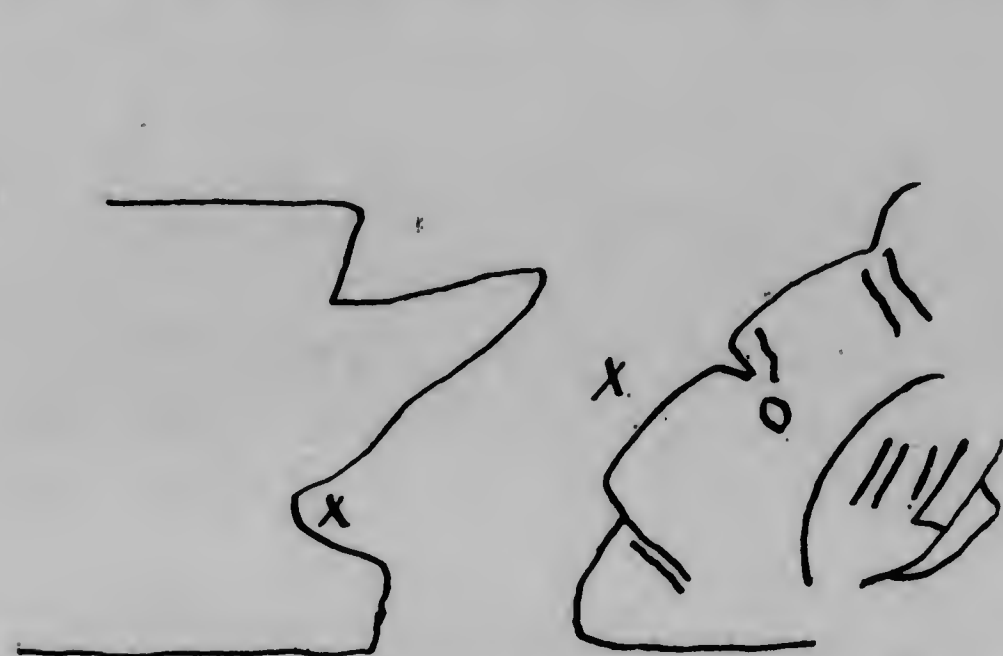


FIG. 17.—Profile of rock and gargoyle-like figure cut therein. (The head was carved at X.)



FIG. 18.—Outline of stone fetish.

chamber, like a gargoyle (fig. 17). The drawings of the above petroglyphs are all about one-sixth of their actual size.

There is another cave on the Jacksonville property on Flamingo Hill. I could find nothing of interest in this cave; but this is scarcely to be wondered at, as the shaft of the cave runs down perpendicularly for about twenty feet. There are the usual mounds on Flamingo Hill, about eight in number, in one of which I found a small stone fetish (fig. 18), three small fragments of ornamented pottery of no especial interest, and a fragment of a stone implement of light-green jadeite (fig. 3, *a*).

Around and on another mound I found a small head belonging to the rim of a bowl (fig. 5, *c*); four sherds of ornamented pottery; about fifteen plain fragments; a jadeite chisel, highly polished, with a cutting edge; and a black flint scraper, also highly polished and with a cutting edge.

Another small pottery head (fig. 5, *b*), which has been lent to me, also was found on the Jacksonville property. This head evidently was meant to represent some animal, and I can not say whether the fact or its having no left eye is by accident or design. A small, highly polished jadeite scraper was also found here.

Kelly's Cave (Sail Rock).—According to report finds have been made here, but I had no opportunity to visit the spot.

Duck Pond Cave (Goodshill Settlement).—Here also pottery fragments and implements have been reported to occur. The Goodshill settlement is on the southwestern coast of East Caicos and about ten miles from Jacksonville.

161 Clifton Avenue

Newark, New Jersey

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CERTAIN ARCHAEOLOGICAL INVESTIGATIONS IN
TRINIDAD, BRITISH WEST INDIES¹

By THEODOOR DE BOOY

INTRODUCTION

AS this paper is intended solely to put on record the excavations made by the writer and some of the resulting specimens, it does not seem advisable to go extensively into the previous literature existing on the archaeology of Trinidad. Neither does the writer consider it imperative to illustrate many of the artifacts found or to discuss them at length, he being more desirous of explaining the conditions under which the objects were found. Some three thousand specimens in all were sent to the Museum of the American Indian from Trinidad during the four months that the writer worked on this island and it would require a bulky monograph to thoroughly describe each separate specimen.

Dr. J. Walter Fewkes, of the United States Bureau of American Ethnology, made a survey of some of the shell-heaps at Erin Bay on the south coast of Trinidad for the Museum of the American Indian (Heye Foundation) (which at that time was known as the Heye Museum),² and the Reverend Thomas Huckerby, who was then

¹ After an archaeological exploration of the island of Margarita off the north coast of Venezuela from February to May, 1915, described by the writer in a previous paper, (Booy, Theodoor de, "Certain Archeological Notes on the Island of Margarita (Venezuela)," *Contributions from the Museum of the American Indian (Heye Foundation)*, Vol. II, Number 5), a certain amount of work was done in the British island of Trinidad, 120 miles to the eastward of Margarita and the writer remained here from May until September of the same year. The local government of this latter island and a number of the residents and landowners were of great assistance to the writer in his archaeological work and he wishes to take this opportunity to tender the thanks of both the Museum of the American Indian (Heye Foundation) and of himself to Paul Urich, Esq., of the St. Bernard Estate near Cape Mayaro, on whose property the greater part of the work was done, to Mrs. Paul Urich for her unfailing kindness and hospitality, to Carl Boos, Esq., of Port-of-Spain, for his aid in innumerable matters and to the officials of the Royal Victoria Institute of Port-of-Spain.

² Fewkes, J. Walter, "Prehistoric Objects from a Shell-heap at Erin Bay, Trinidad," *American Anthropologist* (N. S.), vol. 16 (April-June, 1914), pages 200-220.

living in Trinidad, conducted some excavations on the St. Bernard estate near Cape Mayaro, the results of which excavations are now in the Museum of the American Indian (Heye Foundation) as are the specimens obtained by Dr. Fewkes at Erin Bay. The Huckerby specimens proved to be somewhat different from those collected by

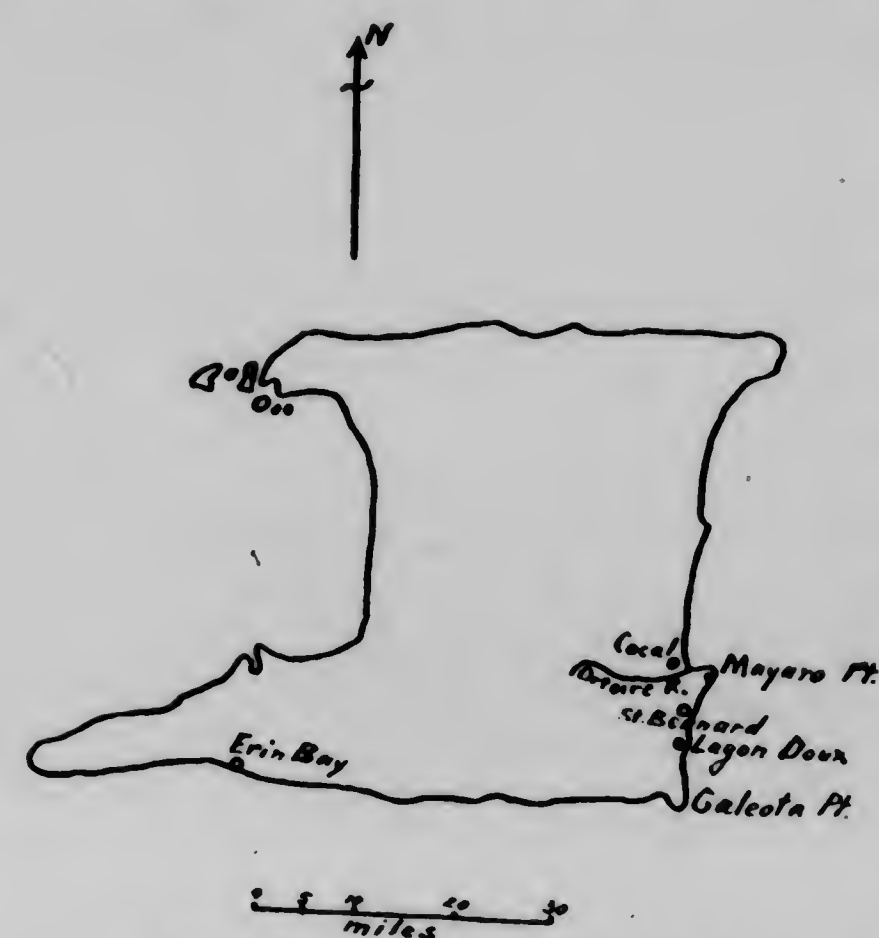


FIG. 61.—Map of Trinidad.

Dr. Fewkes and as Mr. Huckerby obtained only comparatively few objects, the writer decided to make a thorough investigation of the remains on the east coast of Trinidad, to see if a different culture could have existed there. On arrival at Port-of-Spain, therefore, he was introduced to Mr. Paul Urich, who owns extensive plantations on the east coast of the island near Cape Mayaro (see map, fig. 61) and received a cordial invitation to come there

and to excavate on the St. Bernard property. It was on this same property that Mr. Huckerby had made a number of somewhat superficial investigations and had collected those specimens that had first drawn the writer's attention to a difference between the east coast and the south coast pottery.

The shell-deposits in which the pottery and other pre-Columbian objects were found are situated on the St. Bernard property, about one and one half miles south of Cape Mayaro and one fourth of a mile inland from the sea beach. It is likely that in pre-Columbian times these deposits were a far greater distance from the sea, possibly from three fourths of a mile to a mile. The tides on this part of the east coast of Trinidad are so strong that the seashore is constantly being pushed further inland; on riding along the shore, one sees stumps of cocoanut trees on the beach as mute evidence of groves that existed before the sea swept them away and a number of the palms overhang the beach itself with part of the roots exposed by the action of the waves. After each severe easterly storm, a



EXCAVATIONS IN PROCESS IN ST. BERNARD MIDDENS, TRINIDAD

a. Clearing ground for trench. b. Diluvial deposit covering shell-heaps. c. Trench, 10 feet wide, through hummock. d. Shell- and ash-layer in deposit. e. Ash-layer in deposit underneath layer of *Livella mactroides*. f. Sherd *in situ* in shell-layer.

number of the trees fall, owing to the fact that the waves have washed away the soil and sand that supported the roots. The writer has been assured by competent geologists that probably not more than five hundred years ago, the shore ran in a straight line from Mayaro Point to Galeota Point, which would place the St. Bernard middens fully a mile inland.

The St. Bernard deposits cover an area of possibly from six to eight acres of land and lie in what now is a cocoanut grove and what some sixty years ago was a field of sugarcane. Since the abandonment of the village site by the aboriginal inhabitants and the subsequent sugarcane and cocoanut cultivation, the shell-heaps have become covered with a diluvial deposit from one to two feet deep, so that the individual middens can hardly be recognized amid the light undergrowth that covers the soil. The writer was not able to determine the number of the individual hummocks for this reason and had to make his excavations in those places where test holes proved the deposits to be the thickest.

The first process in the excavations was to clear the slope of a hummock of the small brush and to run the lines of a future trench in such a manner that they avoided the cocoanut trees as much as possible. A clearance three feet in diameter had to be given to each tree in order to avoid damaging the roots too much. The accompanying illustration, plate III, *a* gives one an idea of the largest hummock found on the St. Bernard estate which hummock was about ten feet high. The roots of the cocoanut trees interfered to a great extent with the excavations and are no doubt responsible for a considerable amount of breakage of the pottery objects found; also, the writer had to watch the laborers constantly to prevent their chopping off the roots too near to the trees, in which event a number of the palms would have been damaged beyond recovery. It generally was possible to make the trenches from ten to twelve feet wide and to excavate in such a manner that the shells and the soil filled the trench up again back of the laborers, leaving eight feet of the bottom of the trench cleared between the cut and the refilled trench. An excavation of this sort can be seen in plate III, *c*.

The deposits themselves ranged in depth from seven feet to less than a foot and, as has been stated, were covered with from one to two feet of diluvial deposit. Practically no objects were found in the diluvial covering, with the exception of small sherds and shells that had been moved towards the surface at those times when the soil was disturbed in cultivation. This diluvial deposit can be clearly seen in plate III, *b* and the first shell-layer under the diluvium is indicated by the laborer with his cutlass. Under the diluvial deposit came a series of clearly defined shell- and ash-layers showing the various periods of occupation of the village site. These layers reached a large number where the deposits were seven feet thick and, as is shown in plate III, *d*, did not run parallel to the surface of the ground nor did they run parallel the one to the other. It would seem as if the aborigines built their refuse-heaps in a different spot on each successive occupation, although on the same village site, which practice would account for the various angles at which the layers ran. The artifacts were most generally found in the darker ash-layers shown in the illustration. Fairly large fragments of charcoal were met with in the ash-layers and also pieces of pitch or manjak. These latter pieces probably came from the deposits that are found in various places on the east coast of Trinidad. It may be mentioned that the writer excavated a number of pottery fragments that showed signs of having been covered with this pitch; whether these fragments are of vessels in which the pitch was melted or whether the pitch had been put in the vessels to mend them, the writer is not prepared to state definitely, although in one or two instances he is almost positive that vessels had been so restored.

The shells in the shell-layers of the deposits were not mixed with soil and were comparatively clean. The ash-layers, on the other hand, were a sticky gray mass in which bone fragments, shells, charcoal and ashes were mixed. A typical ash-layer is shown in plate III, *e* and underneath this layer can be seen a shell-layer composed of the shells of *Tivela mactroides*. The writer estimated that some 40 per cent. of the shells found in the St. Bernard deposits were of this latter species and some 58 per cent. of the

Donax variabilis, which is the small shell shown in plate III, *f*. In this illustration also is shown a large fragment of a pottery vessel *in situ*. The *Donax variabilis* is locally known as the "chip-chip" shell and is found in enormous numbers on the beach at certain times of the year. The present-day inhabitants gather these and make them into the locally renowned "chip-chip soup," a somewhat sandy delicacy greatly esteemed by the negro population. The aborigines undoubtedly used the chip-chip as one of their staple articles of diet and at those seasons when they were not found in abundance probably used the *Tivela mactroides*, which is found mostly on the sea beach north of Cape Mayaro and, strange to say, is hardly met with on the beach south of the Cape. Incidentally, the writer is of the opinion that the shells of this latter species were "steamed" in order to prepare them for food, in contrast to the chip-chip shells, which were boiled. He bases his contention on the fact that where the chip-chip shells are found clean and white in the deposits, the *Tivela mactroides* shells were always found in a blackened condition. The chip-chip shells are so small that "steaming" them would be out of the question and the only way they can be prepared is to cook them so as to detach the small animal from its shell.

The writer is indebted to Mr. L. P. Gratacap, of the American Museum of Natural History, for the identification of the shells found in the deposits and to Dr. F. A. Lucas, the director of the same institution, for the identification of some of the bones.

The sea shells found in the St. Bernard kitchen-middens are the following:

- Donax variabilis* Say.—58 per cent.
- Tivela mactroides* Born.—40 per cent.
- Ostrea cristata* Born.
- Pecten nodosum* Linnaeus.
- Scapharca brasiliensis* Lamarck.
- Lucina jamaicensis* Lamarck.
- Tellina interrupta* Wood.
- Labiosa canaliculata* Say.
- Dione veneris* Argenville.
- Melongena melongena* Linnaeus.
- Melongena morio* Linnaeus.

Strombus gigas Linnaeus.
Cypraea exanthema Linnaeus.
Astrarium tuber Linnaeus.

Of fresh-water shells the following two varieties were found:

Ampullaria spixii Orbiguy.
Ampullaria cornu-sarietis Linnaeus.

One species of land-shell was found, that of the

Strophocheilus (Borus) oblongus Miller.

Besides these shells, a great number of fragments of madreporal coral were found in the deposits.

Of the bones, those that were identified were of the

Deer—*Odocoileus gymnotis*, of the
 Collared peccary—*Pecari angulatus angulatus* and of the
 Green turtle—*Chelone mydas*.

A number of bones were found of fishes and of some of the smaller mammals which were not identifiable. The St. Bernard deposits also produced a number of crab carapaces and claws and the large crabs found in this neighborhood are even today a favorite food of the inhabitants.

Unlike on the island of Margarita, no split human bones were found in the shell-heaps. The writer found two burials in the middens and the skeletons were found in such a bunched-up position that he came to the conclusion that the dead had been placed in a contracted position, and probably had been buried in their house site. This was not an uncommon practice of the Antilleans and it was usual to afterwards abandon the house and move to another spot.¹ The two burials in question were found in a layer of sea sand under and above which were the usual shell- and ash-layers, evidence that the village site had been used before and after the deaths had taken place. It was not possible to preserve the brittle bones, but, judging from the skull fragments, the heads had been artificially flattened. The writer was especially struck by the appearance of the teeth of both skeletons: they were quite

¹Fewkes, J. Walter, "Relations of Aboriginal Culture and Environment in the Lesser Antilles," *Bulletin of the American Geographical Society*, vol. XLVI, no. 9 (September, 1914), page 673.

ground down, as in the case of very aged persons, yet did not show a trace of decay.

Some six miles to the south of the St. Bernard estate, on a property called Lagon Doux, also belonging to Mr. Paul Urich, the writer was shown another shell deposit on the southeastern slope of a hill about four hundred feet high and lying a mile inland from the sea beach. These deposits, however, were not thick enough to warrant the conducting of excavations and, due to centuries of rainfall, the middens had been washed down the slope of the hill and distributed over a large area with a resulting breaking-up of the objects into small fragments. A number of shallow deposits were also found by the writer on the extremity of Cape Mayaro, some three hundred feet above sea level. A cursory examination was enough to show that the deposits were too shallow to produce objects that would make excavating worth while.

On the Cocal property, about four miles to the north of Cape Mayaro, the writer discovered an isolated shell-heap, twelve feet high with a diameter of about fifty-five feet, composed almost exclusively of the shells of *Tivela mactroides*. This shell-heap presented a curious problem to the investigator, as its height and isolation made it prominent in the landscape. Shallow shell-deposits were found bordering it on all sides but, as in the previously cited cases, the writer did not consider it worth while to excavate in any of these, although test holes and small sherds on the surface of the ground proved conclusively that an Indian occupation had existed here. A ten-foot trench was dug through the isolated mound north and south and another ten-foot trench east and west, forming a cross over the summit of the mound. While a large number of small pottery sherds had been found on the surface of the ground in all directions from the mound, not a single sherd was found in the mound itself. Three hammerstones were found and two small pieces of rock-crystal, the latter evidently having been brought there from the northern mountain range of the island of Trinidad, the only place on the island where these crystals are found according to reputable local geologists. It will be seen, therefore, that this isolated mound, exclusively composed of shells,

in which no ashes, or bones and practically no artifacts were found, presents a curious problem compared to the other shell-deposits on the east coast of Trinidad, a problem which the writer is not able to solve.

ARCHAEOLOGICAL RESULTS FROM THE EXCAVATIONS

The most typical of all the various pottery vessels found in the St. Bernard middens is a shallow bowl form with a broad angular rim. It is safe to say that of the sherds found, at least 75 per cent. indicated that they belonged originally to a vessel of this type and this form, therefore, in its many variations, can be taken as being typical of the east coast region of Trinidad.

The simplest form of vessels of this type is the small bowl *a* shown on plate iv. This little dish has a main diameter of $7\frac{1}{4}$ inches and an inside diameter of $5\frac{1}{2}$ inches and its height is $1\frac{7}{8}$ inches. The angular rim itself is $\frac{7}{8}$ inch wide and was covered with a red paint by the potter on the upper surface. The body of the bowl is of a buff color and the paint on the rim was probably applied after the firing of the vessel and can easily be washed off. The pottery is $\frac{3}{8}$ inch thick. It must be noted that in all vessels of this type the height of the vessel is from $\frac{1}{3}$ to $\frac{1}{4}$ of its outside diameter. The base of this type of vessel is invariably flat but, judging from sherds found, was in some instances extended into a circular stand to give added stability to the vessel. While the specimen illustrated has a painted rim, a large number of bowls of this type were found of which the rim had not been painted and was of the same color as the vessel proper. This then is the simplest form of the type under discussion.

The next addition to the decoration of this type of bowls are the handles and an astonishing variety of forms of the latter were met with in the St. Bernard deposits. In plate v, *a*, can be seen one of these bowls to which has been added two loop handles of a somewhat elaborate pattern. Outside of this addition the bowl does not differ materially from the one previously described, excepting that it is far larger. The diameter of the bowl itself is 12 inches and its depth 4 inches. The thickness of the pottery is $\frac{3}{8}$ inch and the ware is buff colored.



POTTERY VESSELS FROM ST. BERNARD MIDDENS

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POTTERY VESSELS FROM ST. BERNARD MIDDENS

Then again, the potter took the plain bowl of this type and added a design of incised lines to the rim. The simplest form of this were from one to six concentric lines running around the rim. In plate IV, *b*, can be seen a small bowl to which the potter, by way of decoration, has added two incised lines running concentrically around the rim and four extra semi-circular lines from the outside incised lines to the outside of the rim. The main diameter of this small bowl is 7 inches and the inside diameter $5\frac{1}{2}$ inches: the height is $1\frac{3}{4}$ inches and the ware $\frac{3}{8}$ inch thick. This bowl is reddish-brown in color.

In addition to the incised lines, the potter occasionally added nodes or lugs on the rim and an example of this decoration is shown on plate IV, *c*. The rim of this specimen has concentric incised lines and four nodes which are placed equidistant. The nodes probably represent highly conventionalized heads. The specimen under discussion has an outside diameter of $8\frac{1}{2}$ inches, an inside diameter of $5\frac{3}{4}$ inches and stands $2\frac{3}{4}$ inches high. The ware is $\frac{3}{8}$ inch thick and the vessel is buff-colored.

The most highly decorated form of all is where in addition to the incised lines on the rim, handles of various forms have been added. While only a comparatively small part of the bowl shown on plate V, *b*, was recovered, this specimen may serve to illustrate the highest development of decoration of the type of vessel under discussion. This specimen has an angular rim upon which incised lines have been carved. Furthermore, nodes have been added to the rim and besides these, a handle representing a conventionalized human head. This head is quite massive and it is permissible to state that another head of the same type must originally have opposed it on the rim. The original diameter of this bowl was 12 inches and its estimated height $4\frac{1}{2}$ inches. The ware is $\frac{3}{8}$ inch thick and reddish-brown in color.

A critical examination of all vessels with angular rims found in the St. Bernard shell-heaps will reveal the fact that each and every one of them can be classified under one of the vessels described above. The vessels range in size from some with an outside diameter of 3 inches and a height of 1 inch to the largest with an outside diameter of $16\frac{1}{2}$ inches and a height of 5 inches.

Yet another type of bowl was found to occur frequently in the deposits and one of these is shown on plate v, *c*. This, of course, is the simplest form of round vessel that it is possible for a potter to make. A number of small differences in outline can be found but fundamentally, the bowls are of course the same. The specimen illustrated has a diameter of 10 inches and a height of $3\frac{1}{4}$ inches. The ware is $\frac{3}{8}$ inch thick and is of a gray-brown color. The rim is slightly thicker than the base part of the vessel. The base of this bowl is indented. The inside of this vessel is partly covered with pitch or manjak, and the writer has already mentioned the occurrence of this latter substance in the shell-heaps. He does not believe that in the case of the illustrated vessel this pitch was employed to mend a break in the bowl, as to his mind, in that event the pitch would have probably been applied to the outer surface of the bowl. The writer presumes that the vessel must have been used as a container for the molten pitch. A number of sherds were discovered, however, that had the pitch applied to the inner and to the outer surface, and cases were met with where the vessel showed signs of having been cracked under the pitch-layers. It is permissible therefore to assume that the aborigines were in the habit of mending their cracked vessels with layers of pitch to strengthen the cracked place and to make the vessel liquid-tight.

A slight variation on this type of shallow bowl is shown on plate iv, *d*, where the convex basal part of the vessel is topped by a perpendicular rim. This rim is $1\frac{1}{2}$ inches high and has been painted red on the in- and on the outside. The body of the bowl is yellow and the entire vessel stands $2\frac{3}{8}$ inches high. The diameter of the bowl is 6 inches, and the ware is $\frac{1}{4}$ inch thick.

This type of vessel, of which the two specimens described above can be considered typical samples, occurred in large quantities in the middens. Occasionally the rim was thickened or painted and the vessels ranged in size from a diameter of $3\frac{3}{4}$ inches (the smallest specimen of this kind found) to a diameter of $13\frac{1}{2}$ inches.

Perhaps the most unusually shaped vessel found in the St. Bernard deposits is the one illustrated on plate v, *d*. The writer knows of no other vessel like it from the West Indies and considers

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POTTERY BOWLS FROM ST. BERNARD

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the form unique. The handles of this four-cornered bowl undoubtedly represent the heads of the armadillo, an animal that is frequently found in Trinidad and that is considered a great delicacy by the natives. It may be mentioned that a large number of heads were found in the shell-heaps that represented the armadillo and we judge from this that it was a favorite practice of the aborigines living around Mayaro to thus ornament their pottery vessels. Incised circles ornament the two other terminals of the vessel under discussion and an incised cross can be seen in the one, while the opposite circle contains twelve impressed pits. The bowl is not well made as far as symmetry is concerned. It has a flat base and stands 5 inches high at the rounded terminals. The length of the vessel across the heads is $13\frac{1}{4}$ inches and it has a short axis of $10\frac{1}{4}$ inches. The ware is quite thin for such a large vessel, $\frac{1}{4}$ inch. The color of the bowl is buff. Between the heads and the rounded terminals can be seen panels of incised decorations. There is a small lug on either side of the heads and another lug below the incised circle of the rounded terminals.

Another vessel of elaborate pattern is that shown on plate IV, *e*, a fragment of which is also illustrated *in situ* in plate III, *f*. It is likely that this is one of the so-called turtle-bowls, judging from the shape and design of the incomplete vessel. The head of the turtle can still be seen, but the tail is missing. The four rounded parts of the rim—of which three remain—represent the flippers of the turtle in a conventionalized manner and the outside of these flippers have been decorated with cross-hatched incisions and covered with a dark-red slip of pigment on the in- and on the outside. The rounded parts of the rim are surmounted by a small lug with two incisions. The base of this vessel is flat. The diameter of this bowl is 7 inches and it stands 2 inches high where the head is and $3\frac{1}{4}$ inches at the highest point of each flipper. The ware is $\frac{1}{4}$ inch thick and the body of the bowl is painted yellow.

On plate IV can be seen another unusual bowl, *f*, of which but a fragment was found. This vessel originally must have been rectangular in shape and has a flat, round base. A grotesque human head serves as handle at the one end and it would be inter-

esting to know whether the other terminal was provided with a handle and if so, what shape it had. An incised line surrounds the rim on the outside and the rim has been covered with a dark-brown slip of pigment, also on the outside. The grotesque head also has been covered with this dark-brown pigment. The vessel has a width of $6\frac{1}{2}$ inches and an estimated length of about 8 inches. The height is $2\frac{1}{2}$ inches and the ware, brown in color, is $\frac{3}{8}$ inch thick.

The small vessel illustrated on plate VI, *a*, is unusual in so far that it reminds us more of the pottery from Santo Domingo and Porto Rico with its incised decoration surrounding the rim in a geometrical pattern. The outline of this vessel was restored from the fragments found and it cannot be determined whether the base was flat or rounded. The largest diameter of this bowl is $4\frac{3}{4}$ inches and the diameter of the mouth $3\frac{3}{4}$ inches. The ware is $\frac{3}{8}$ inch thick and the bowl is brown in color.

The flat, discoidal-shaped vessel with the comparatively small mouth illustrated on plate VI, *c*, recalls to our mind the sea-urchin and it may well be that the potter derived the contour of this bowl from the shape of this animal. This vessel is unique in shape as far as the West Indies are concerned and no other fragments of like vessels were found in the St. Bernard deposits. The little bowl stands but $2\frac{1}{2}$ inches high and its largest diameter is $6\frac{1}{4}$ inches, while the diameter at the mouth is $3\frac{1}{2}$ inches. The thickness of the ware, which is brown in color, is $\frac{1}{4}$ inch. An incised line surrounds the mouth of the vessel and forms the only decoration.

The smallest vessel found is the one illustrated on plate VI, *b*, which stands but 2 inches high. It can hardly be supposed that this miniature vessel was intended for a container. The vessel is provided with two small, perforated lugs. An incised line surrounds the rim and two more incised lines the body of the vessel. The ware is brown in color and $\frac{1}{4}$ inch thick. No sherds were found of other vessels of this small size.

A number of double paint-bowl vessels were found in varying sizes and the smallest of these is illustrated in plate VI, *d*. The length of this specimen is $4\frac{3}{8}$ inches and the height $1\frac{1}{2}$ inches. The ware is brown in color and $\frac{3}{16}$ inch thick. There is a small lug on each side of the wall separating the two bowls.



POTTERY OBJECTS FROM ST. BERNARD REFUSE HEAPS

The small perforated globular object with the incised lines, shown on plate VI, *f*, is either a pottery bead or else was used as a spindle whorl. This is the only specimen of this kind recovered from the Mayaro kitchen middens.

A very large number of pottery heads and handles were excavated in the shell-heaps. These do not differ materially from those illustrated in Dr. Fewkes' paper on the archaeology of Trinidad¹ or from those figured in the writer's paper on the archaeology of Margarita Island.² The heads shown in Dr. Fewkes' paper, from Erin Bay on the south coast of Trinidad are of a slightly coarser manufacture, but resemble the Mayaro specimens in type. It may be noted in this connection that all the St. Bernard pottery was of a more delicate finish than that from Erin Bay and the vessels were not as thick as the vessels collected by Dr. Fewkes. The writer only figures two of the heads collected in the St. Bernard deposits, as these two heads are uncommon in type and are of a variety not previously figured. Specimen *a*, plate VII, is an extremely massive head and larger than the usual types and represents a conventionalized human head. The mouth and the eyes are depicted by incised lines: small impressed pits serve to indicate the nostrils and the ears also have pits to indicate perforations. This specimen stands 4 inches high and is dark-gray in color. Specimen *b* of plate VII is a flat handle and also represents a conventionalized human head. No other specimen like it was found or is known to the writer, from the West Indies. The head is flanked by large scroll-like ornaments. The forehead is ornamented with cross-hatched incisions, as is the back of this handle. The height of this specimen is $3\frac{3}{4}$ inches and it is dark-brown in color.

An extremely large number of spool-shaped pottery rests were found, of varying sizes and two of these objects, *c* and *d*, are illustrated on plate VII. *c* has an inside diameter of $2\frac{5}{8}$ inches and an outside diameter of $4\frac{1}{4}$ inches and stands $1\frac{1}{2}$ inches high. The ware is $\frac{3}{8}$ inch thick and is brown in color, covered with a red slip of pigment. *d* has an inside diameter of $2\frac{1}{2}$ inches, an outside diam-

¹ Fewkes, J. Walter, *op. cit.*, plates XVI, XVII, XVIII, and XIX.

² Booy, T. de, *op. cit.*, plate II.

eter of $4\frac{5}{8}$ inches and stands $2\frac{1}{2}$ inches high. The ware is $\frac{1}{2}$ inch thick and is brown in color covered with a red slip. Incised lines decorate the body of this rest. On *c* can be seen single and double nodes which are placed symmetrically around the rim of the object. Some of the pottery rests found were ring- instead of spool-shaped and an astonishing variety of ornamentation was found in the objects of this class.

The writer has purposely left a discussion of the highly decorated painted pottery to the last. It has already been stated that many of the vessels and sherds found showed that a superficial slip or wash of paint had been applied to the ware. This, however, had either been applied after the firing of the clay or else had been ap-



FIG. 62.—Pottery monkey head.

plied before the firing and had not become a very substantial part of the ware. A very large number of fragments were found, however, upon which was found a heavy slip of solidly-applied pigment in geometrical designs and these fragments seem to have been subjected to great heat in the firing and are far less brittle than the specimens previously described. Three of these sherds were found on Margarita Island¹ and these sherds were identical with some eight hundred fragments found in the St. Bernard middens. It must be noted that on no other part of Trinidad have sherds of this class been found to the writer's knowledge. What makes the finding of this kind of pottery all the more interesting to the archaeologist is the fact that it was not possible to reconstruct a single vessel from the sherds found: not only were no sherds of one same vessel found but no two sherds were found even that fitted on to each other. In the object illustrated in fig. 62, the reader will note the presence of "breaks" in the object, but these breaks

¹ Booy, T. de, *op. cit.*, page 20, fig. 7.



a



b



c



d

POTTERY HEADS AND POTTERY RESTS FROM ST. BERNARD MIDDENS



a



b



c



d



e



f

POTSHERDS, LUGS, AND POTTERY HEADS FROM ST. BERNARD MIDDENS

were the result of the excavation and not of the later matching together of the pieces. It would seem, therefore, as if the aborigines that made this particular class of pottery not only broke the vessels up, but took pains to distribute the resulting fragments over a large area. The writer can offer no explanation for this seemingly meaningless custom.

On plate VIII, *a* and *c* can be seen two of the sherds under discussion and a superficial examination will convince the reader that these sherds belong to a totally different class of pottery than the kind previously discussed. The ware appears to be far better baked and is not so fragile; the slip is thick and consists of red, brown, yellow, black and white pigment. The designs are applied



FIG. 63.—Large shell-disks.

in geometrical patterns and it is to be regretted that not enough of one design is left on any one sherd to enable the writer to work it out. The vessels were frequently provided with handles, upon which the potter also placed a painted design. One of these handles is illustrated on plate VIII, *b*. Nodes or lugs also were added to the vessels; one of these is shown on plate VIII, *d*. Then again some the vessels must have had pottery-heads, of which a grotesque sample is shown in *f* of the same plate. Another head, *e*, is also shown, which head was part of the base of a vessel.

Judging from a number of the sherds found, some of the vessels served as containers for liquids and had a highly ornamented head

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FIG. 63.—Large shell-disks.

in geometrical patterns and it is to be regretted that not enough of one design is left on any one sherd to enable the writer to work it out. The vessels were frequently provided with handles, upon which the potter also placed a painted design. One of these handles is illustrated on plate VIII, *b*. Nodes or lugs also were added to the vessels; one of these is shown on plate VIII, *d*. Then again some the vessels must have had pottery-heads, of which a grotesque sample is shown in *f* of the same plate. Another head, *e*, is also shown, which head was part of the base of a vessel.

Judging from a number of the sherds found, some of the vessels served as containers for liquids and had a highly ornamented head

on top of the vessel proper which served as a spout. The best specimen found is shown in fig. 62 and probably represents a monkey head. Only two colors, white and red, were used to decorate the gray ware of this object, which stands 4 inches high.

The vessel shown on plate VI, *e*, does not belong by rights to the class of pottery described above, although it has received the same painted slip. The ware of this object however is brittle and not well baked and resembles the ware of the vessels first described in this paper. The decoration is red and white in geometrical design over a brown ware and the writer is inclined to believe that the potter intended this vessel to represent a turtle. Four nodes represent the flippers and the tail is shown. The head has been broken off. This vessel stands 4 inches high and has a main diameter of $5\frac{1}{2}$ inches. The diameter of the mouth is $1\frac{1}{4}$ inches.

A large number of fragments of pottery griddles for the baking of cassava bread were found in the shell-heaps, which fragments did not differ from objects of the same class found throughout the West Indies.



FIG. 64.—Pendant of Amazon stone.

Two large shell-disks were found, shown in fig. 63, which undoubtedly were objects of personal adornment. These disks or gorgets have a diameter of $2\frac{1}{4}$ inches and are about $\frac{3}{16}$ inch thick.

Yet another pendant ornament is shown in fig. 64. This little object is made of Amazon stone, is $1\frac{5}{8}$ inch long and 1 inch wide and $\frac{1}{8}$ inch thick.

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NEW YORK CITY

Retake of Preceding Frame

Am. Anthropologist, Vol. 9, No. 2, April-June
1907

ABORIGINAL ANTIQUITIES IN SAINT KITTS AND
NEVIS

By C. W. BRANCH

INTRODUCTION

The islands of St Kitts, or St Christopher, and Nevis, in the Lesser Antilles, though very small, are singularly rich in traces of Indian occupancy. St Kitts, we may infer from the name given it by the Caribs — *Llamuiga*, said to mean 'the fertile,' — was a favorite resort of those Indians.

At their discovery by the Spaniards the Lesser Antilles were all inhabited by the warlike Caribs, who remained in possession until displaced by the English and French settlers in the seventeenth century. Whatever may have been the origin of these Indians, there is no doubt that they must have displaced others in turn. This may be inferred from the analogy of all other races of whom the history is known, from their own traditions, and perhaps from the curious fact of their having two languages spoken by the men and the women respectively. We may therefore take it for granted that the traces found may represent successive occupancy by at least two different peoples. Mr im Thurn, in British Guiana, has been able in some instances to distinguish the relics of the late-coming Caribs from those of the aborigines; but nowhere in the West Indies has such a segregation yet been found possible.

The study of specimens from the Lesser Antilles has been limited almost to the Guesde collection¹ and the objects described by Mr im Thurn.² More careful search will reveal the shell implements and ornaments, the pottery, and the burials in these islands; and no doubt as investigations are continued the history and relations of the tribes will in time be determined. The writer hopes

¹ O. T. Mason, The Guesde Collection of Antiquities, *Smithsonian Report for 1884*, Washington, 1885.

² West Indian Stone Implements, *Timehri*, vols. I, II, III.

that the facts collected by him, which are new as regards these two islands, will be accepted as of sufficient importance in themselves, although he may not attempt to offer any explanation of their origin.

In St Kitts and Nevis, as in every other West Indian island, stone implements have been found ever since their settlement by Europeans, and as the memory of the Indians died out, their origin was attributed to the agency of thunder. This curious piece of folklore, which seems to be universal where the stone-age has been forgotten, has aroused the indignation of Mr im Thurn, though treated more philosophically by Stevens. No large collection of these stones has been made, unless we except that of Mr E. Connell of Nevis, which is here included. Very many specimens have become dispersed, some no doubt to find their way into museums, there to be attributed to wrong localities and so still more to entangle the already difficult problems in the ethnology of the West Indies.

Four pictured rocks have long been known in St Kitts. Years ago the writer picked up a conch-shell celt, which was the first known from St Kitts; but many such have since been found. In 1895 a laborer directed the attention of Mr Philip Todd to some bones and fragments of pottery in a gut-side at West-farm, St Kitts. These were presented to Dr W. J. Branch and noted in *Nature*. In 1896, as the result of long-continued search over the island, the writer observed a kitchen-midden at Stone-fort, and subsequently has located similar deposits at five other places in St Kitts. In 1897, while the "picture stone" at Hart's bay was being photographed, another etched rock was found near by. During a few weeks' stay in Nevis in 1897, the writer located two middens and recovered a few specimens from them.

By the kindness of Mr Connell the description and photographs of the stone implements appearing in this paper are taken chiefly from local specimens in his collection.

The work of systematic excavation in the middens has not yet been undertaken, but in the course of frequent visits, when the author conducted some desultory digging, a number of pottery fragments and a few shell objects were collected.

STONE OBJECTS

Form and character.—All the specimens here described were found on the surface, and with few exceptions bear only a vague record of locality. They are characterized by their symmetry of form and careful finish, but on the whole they do not show the complexity of design and high degree of polish seen in museum specimens. As already intimated, only the finest specimens are usually collected and find their way to the museums. In the Connell collection, and also in that of Dr W. J. Branch, there are a large number of simple forms, fashioned from coarse stone as neatly as the material will allow, indicating that the usual working tools were not elaborately made.

Mullers and Rubbers.—Mr im Thurn, though at first opposed to the idea that the Indians of the islands used maize,¹ admits later that such may have been the case. Robertson² criticizes the statement of Acosta that maize, though cultivated on the continent, was not known to the islanders, and in support of his criticism cites Peter Martyr, Gomara, and Oviedo on the use of maize in the West Indies at the time of their discovery.

The extraordinary number of implements of the grinding class found in these two islands show that they were in constant requisition for preparing maize; no grinding of paint or even of clay for pottery could have demanded such a number of tools. Cassava, the chief food of the Carib according to the early writers,³ does not require pounding, nor is it best prepared by such treatment. The use of maize only seems to explain the occurrence of such a large number of mullers. The small specimens were no doubt used for grinding colors and condiments. The mullers vary greatly in form; indeed scarcely any two are identical in size and shape, although they are similar in being made of coarse stone, generally the softer varieties of the usual andesite of the islands being employed.

The simplest type of muller is the conical variety, which may be ovoid with a pointed apex, or straight-sided, the latter being sometimes flat at the apex. In section the tools of this type may be

¹ *West Indian Stone Implements*, op cit., pt. 1.

² *History of America*, vol II, note 32.

³ J. Davies, *History of the Caribby Islands*.

circular or elliptical. The most ovoid specimens have usually a shallow depression in the center of the base. Common examples are figured on plate XXI, 4, 6, 7, 8, 9, and 10. Some of the elongate specimens are compressed toward the base, and appear to have been large celts adapted for use as pestles after the edge had become worn down. No. 5 of the same plate is almost cylindrical. Plate XXII, 8, of hard black stone, has an oblique concave base, and was probably used for smoothing other stone objects.

The first departure from this simple conical shape is a slight constriction near the apex, which, in the specimens illustrated (pl. XXI, 1, 2, 3), are truncated and narrow. The first of these shows the beginning of the next stage, the expansion of the base.

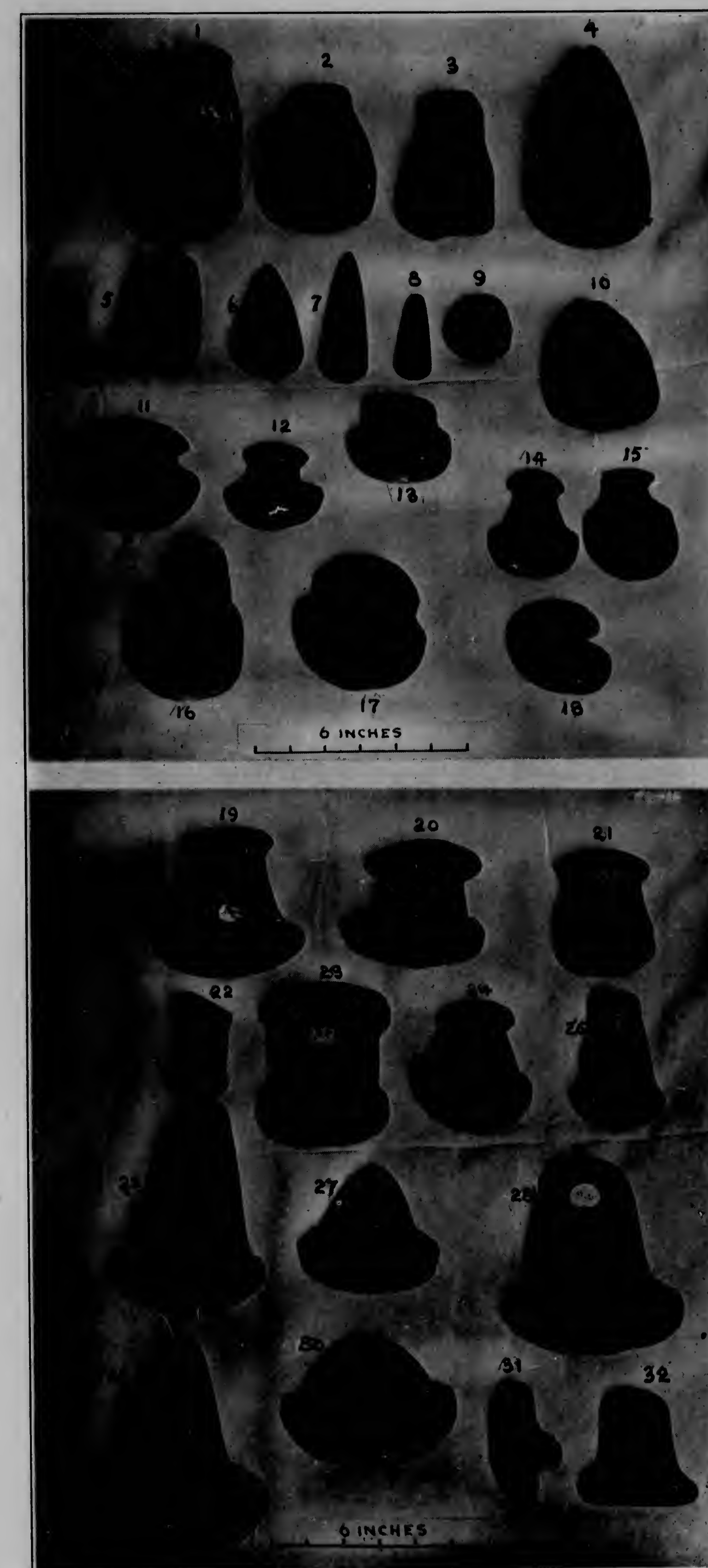
The third type is shown in plate XXI, figs. 26-29, 31, 32. These are all characterized by a more or less expanded base. In section they are elongate elliptical, except that shown in figure 32 of the plate which was circular, but is broken. The conical apex may be acute or truncated, as in the first or simplest type. The base is usually very convex, especially in its long axis. Figure 31 of this plate is a curious little object of this class with an exaggerated base. It is difficult to say to what use the specimen shown in figure 30 could have been put; it is less than an inch thick at the base and has a very thin awkward handle.

In the fourth type the apex as well as the base is expanded in order to afford a better grip. Plate XXI, 19-21, 24, and 25, illustrate this form. In figure 21 the expansion of the base has been removed, probably after the implement was broken, so as to restore the symmetry.

The two objects shown in plate XXI, 22, 23, represent a somewhat rare type in which the apex and the base are equal, giving the implements somewhat the shape of a dumb-bell. This probably has its prototype in the cylindrical form shown in No. 5 of the same plate.

A rare form of muller, having the conical apex curled over either laterally or longitudinally, is seen in plate XXII, 1, 2, 6, and 10.

Hammerstones. — This form of implement includes some carefully worked specimens resembling the third and fourth types of mullers; they are too short to hold in the hand, but are admirably adapted for hafting (pl. XXI, 11, 12, 13, 14, 16). Like most of the



STONE OBJECTS IN THE CONNELL COLLECTION

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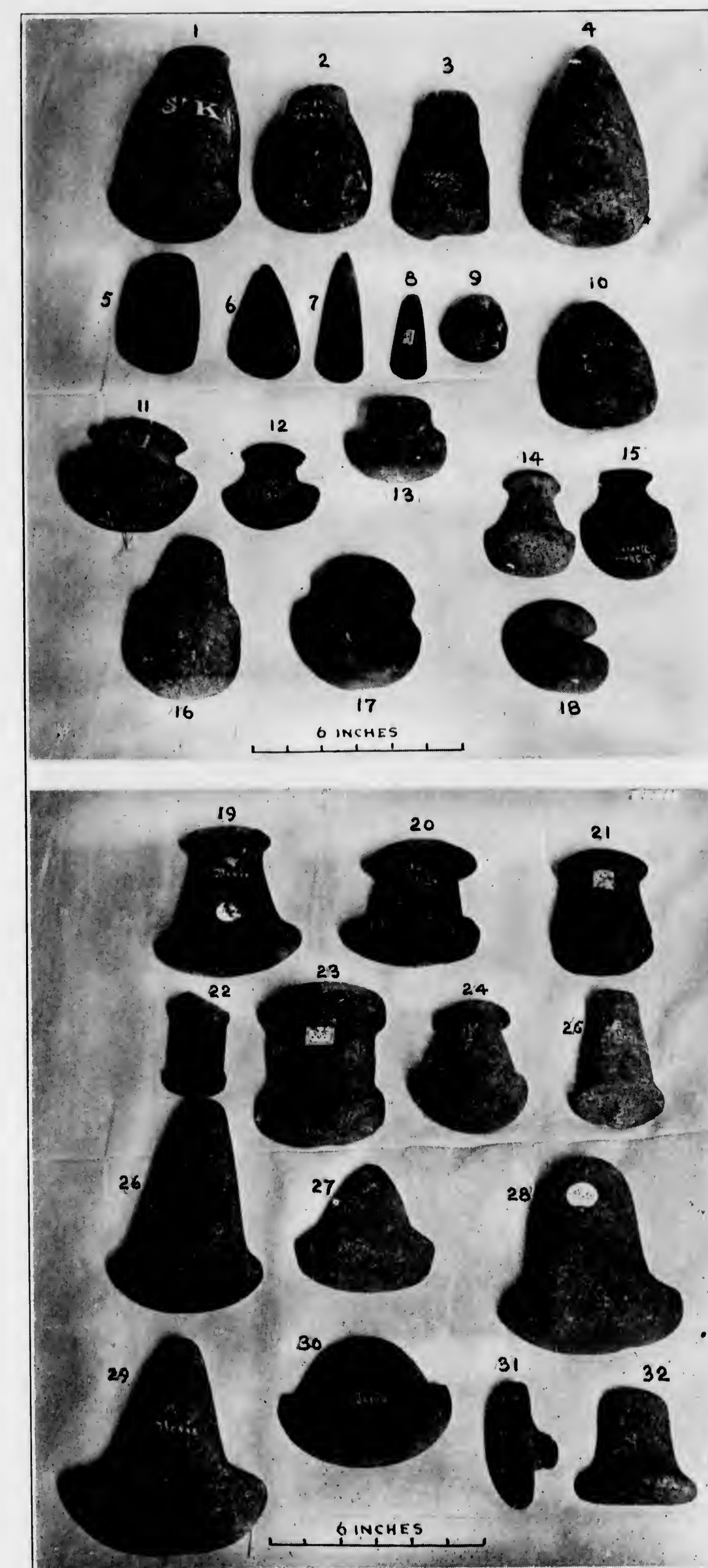
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STONE OBJECTS IN THE CONNELL COLLECTION

muller class of implements these are made of coarse-grain stone, and perhaps were used as maces or club-heads. Water-worn pebbles of dense hard stone, grooved by pecking, are represented in plate XXI, 17, 18. The latter specimen has the groove only half-way around. Otherwise these hammerstones are not worked.

Celts. — Included under this head are the petaloid and Scandinavian types of celt, and wedges. With one exception they are all of hard stone and are finely polished. Some of the smaller ones (pl. XXIII, 7, 14, 15) bear on the apex evident marks of battering, showing their use as wedges, while others, being thicker at the apex, are of decided wedge shape (pl. XXIII, 9, 10). In addition to the usual curved edge, some of the larger celts have a small beveled edge at the apex (pl. XXIII, 17). The exception noted above as being of soft stone is shown in figure 1 of the same plate, and was found by Mr W. Maynard at New River, in Nevis, while trenching to lay a pipe. The writer subsequently found the place to be a midden. This celt is of the Scandinavian type, unusual in stone in St Kitts and Nevis, although common in shell; it is of sandstone, incapable of being polished and rather soft, one would think, for cutting wood. Mr im Thurn is of opinion that objects of this type in the West Indies were intended for weapons and not for tools.

Hatchets. — Mr im Thurn objects to the term axe as applied to stone, and divides implements of this general type into adzes, wedges, and battle-axes. There is, however, abundant testimony by early travelers that savages did use stone axes to fell trees, etc. He considers that the broad blades (pl. XXI, 15; pl. XXII, 7; and pl. XXIII, 19, 20) are adzes and were used for hollowing out tree-trunks after the wood had been charred. But these tools are not usually made of such hard stone as the petaloid celts and consequently are less suited for cutting wood than for chopping flesh; besides, these broad hatchet blades are, in form, the most elaborate of all the implements, and are often decorated with a degree of care that is far more likely to be bestowed upon weapons than on mere tools meant for everyday use. That many celts were used also as weapons is more than likely, while on the other hand the hatchet blades (pl. XXI, 15; pl. XXII, 7) are extremely blunted, so that even if originally intended for use as weapons they must have been put to

more commonplace use on occasion. A fine blade of simple form and with two side nicks, from St Kitts, is figured in im Thurn's *West Indian Stone Implements* (plate VIII, 6).

Other stone objects. — Plate XXII, 4, represents a beautiful little blade of hard dense stone, $8\frac{1}{2}$ inches long, three-fourths of an inch broad, and three-eighths of an inch thick, pointed at both ends and carefully smoothed though not polished. It is almost too brittle for use as a weapon, for since being in the collection it was accidentally broken by a slight blow; nevertheless, protected for most of its length in a hilt of soft wood or hide bound on wet, it may have served the purpose of a dagger. A somewhat similar but larger object is figured by Mr Duerden,¹ and a specimen identical in form with the one from Jamaica is in the collections of the Canadian Institute.²

Plate XXIII, 18, shows a sickle-shape cutting implement, with keen edges at the extreme tip of the smaller end and at the convex margin of the larger end. It may be grasped comfortably at the middle. For skinning and cutting up human flesh this implement would have proved very convenient.

Plate XXII, 3, shows a roughly shaped object, without any attempt at finish, provided with a curved groove along the face of the base. It was probably used for smoothing or sharpening other stone and shell implements.

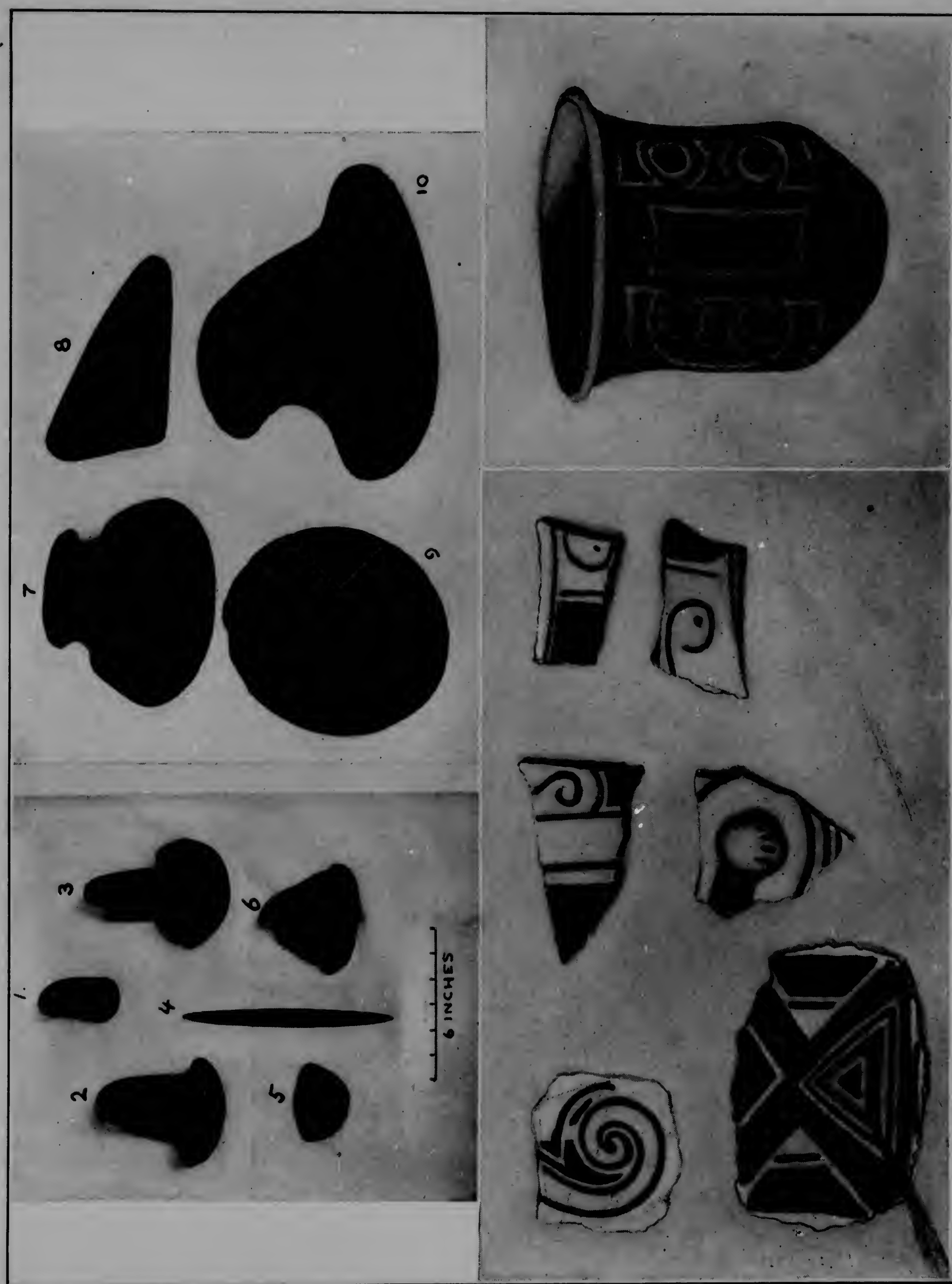
Figure 5 of plate XXII, from St Kitts, is of whitish sedimentary rock, different from anything known on the two islands. It has a groove along the thicker straight margin and pits for the fingers on the sides. It may have been intended for smoothing arrow-shafts or other woodwork.

Plate XXIII, 21, is apparently half of one of the objects vaguely known as "banner-stones," this one perhaps having been of the "butterfly-stone" shape. An attempt at ornamentation has been made by pecking the smoothed surface so as to produce a pattern by contrast. This style of work is seen on some elaborate hatchet heads from other islands.³

¹ *Indian Remains in Jamaica*, fig. 8.

² *Report for 1897*.

³ See *West Indian Stone Implements*, op. cit.



Connell Collection.
Decorated Pottery Fragments.

Figs. 7 and 9 in Possession of Mrs Huggins, of Nevis.
Pottery Vessel, Restored.

STONE OBJECTS AND POTTERY

Plate XXIII, 22, 23, illustrate amulets or charms. It has been suggested that the former represents a vulva, but until more definite evidence of the existence of phallic customs or rites in the West Indies is adduced, we must be content to regard it, like figure 23, as an amulet of unknown signification. The perforation in each of these cases was produced by rubbing a groove on each side till they met, and not by drilling. Figure 24 of the same plate exhibits a bulky crescentic object of considerable thickness. Its function is not known, unless it be an unusual form of rubber or grinder.

Plate XXIII, 25, shows a coarse, much-worn mortar from Nevis. Plate XXII, 9, is a beautiful little oval mortar or stone bowl in the possession of Mrs Huggins. On the near end may be seen a neatly drilled hole; at the opposite end the edge is deficient. Mr im Thurn figures a tiny mortar from St Kitts. With respect to the holes in the Nevis mortar, there can be no doubt that they were drilled. There is an oval stone mortar from St Barts, similar to this one, but without the holes, in the possession of Dr W. J. Branch. In the Connell collection there is a stone "sinker" from Nevis neatly perforated at the small end by drilling from opposite sides.

Figure 21 illustrates a rather remarkable object of somewhat coarse-grained black stone, found by a fisherman in Nevis in 1897 under a shore-cliff where the earth falls from time to time. This implement, or whatever it is, for we can form no idea of its meaning, is $9\frac{1}{2}$ inches long by 4 inches across the head. The butt is an inch and a fourth in diameter and cut square with the sides. The head is set somewhat obliquely to the shaft, and is nearly triangular in section; the upper edge is not sharp.

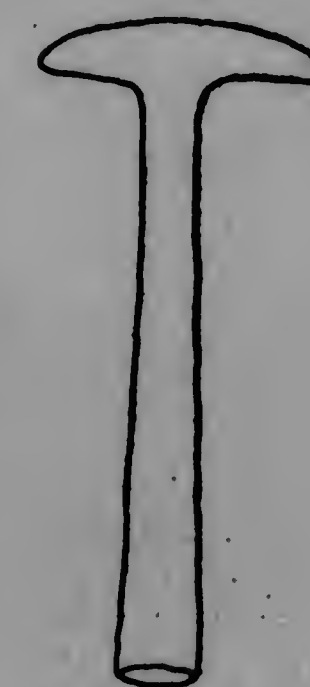
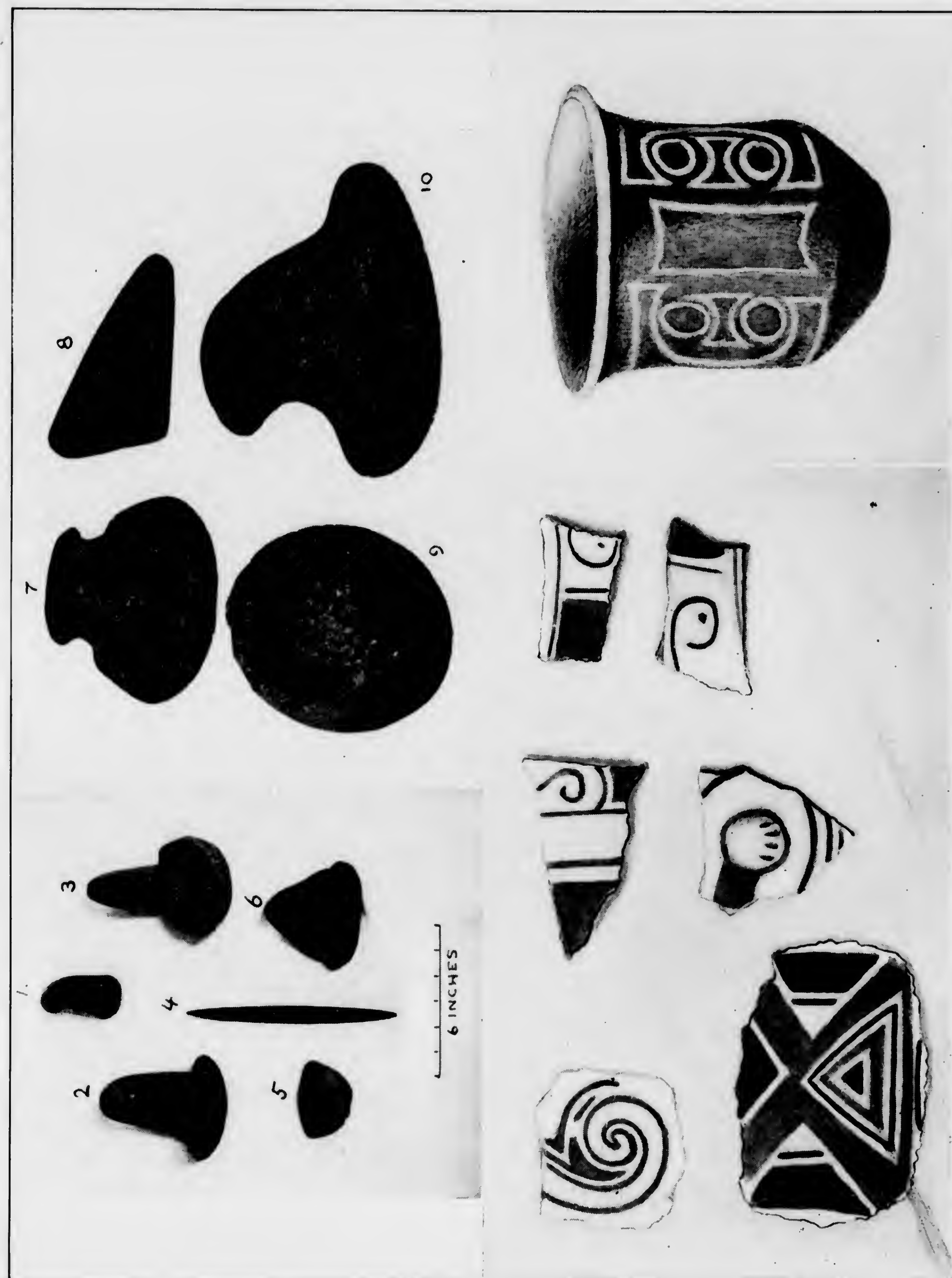


FIG. 21.—Problematical object of stone, from Nevis.

At the Two-mile Hill midden there was found a fragment of an object made of soft sedimentary rock; it is a corner of a thin plate, three-sixteenths of an inch thick and slightly concave. Such a tool may have been used to smooth the surface of pottery before drying.

From the surface of the St Johns midden was procured a fragment of a baking slab of stone resembling the baking tiles of which



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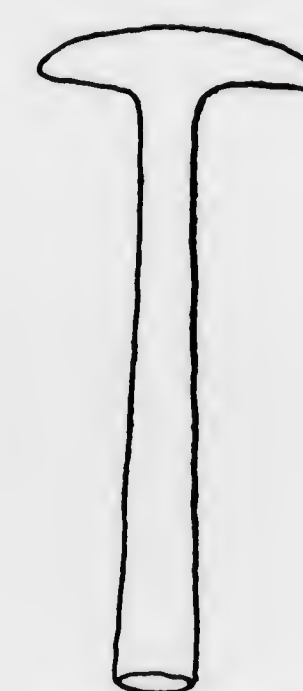


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From the surface of the St Johns midden was procured a fragment of a baking slab of stone resembling the baking tiles of which

numerous fragments were seen at the same spot. Originally the slab must have been circular, about two feet across, three-fourths of an inch thick in the middle, and an inch and three-fourths at the edge.

Half of a biconcave, elongate, oval mealing-stone was found at Stonecastle in St Kitts. The object was originally about two feet long by ten inches broad. One side is more hollowed than the other.

Flint-flakes.—These occur frequently in all the middens, but none have been found reduced to any definite shape. Similar flakes have been recovered from excavations in Jamaica and Demerara,¹ and from their frequency and the freshness of their fracture, artificial origin is indicated. The local flint occurs as nodules, with a thick whitish incrustation, in the shingle of some beaches, being derived from the shore cliffs of clay conglomerate. It breaks with very sharp edges, almost as sharp as glass. The flakes in the middens had been almost certainly used as scrapers and knives.



FIG. 22. — Worked flint, two sides; St Kitts. (2/3)

In January, 1898, there was found in Dr Branch's garden in Basseterre a flint apparently of purposive form (fig. 22). The blade in section is triangular, but not exactly symmetrical, one side being longer; the back is chipped down so as to make a flat surface, which may have been attached to a haft; there is a neat nick at the base; the cutting edge is sharp, but minutely notched by use.

SHELL IMPLEMENTS

As before mentioned, celt-like blades of shell have been found in some abundance in St Kitts, and are just as common in Nevis, though the Connell collection has only about five specimens. The writer is not prepared to agree with the statement that fossil shells from the limestone were used for this purpose. Examination of a large number of specimens from Barbados seems to show the identity of their condition with those of St Kitts, especially in cases

¹ im Thurn, *Among the Indians of Guiana.*

where the latter have been exposed on the surface. There is but little limestone in St Kitts, and none in Nevis, and although the writer has often hunted for fossils, he has never seen a strombus, so that this species must be comparatively rare in the limestone. The St Kitts objects are certainly made from fresh shell, as are probably also those from Barbados.

The common form of adze in Barbados was cut out of the columellar or inner lip of the king-conch (*Strombus gigas*). The anterior end of this lip is upturned to form the canal, and it is this curve that gives the peculiar twist to the end of this form of implement, which Mr im Thurn has aptly called the "shoe-horn" type. From the nature of the shell the cutting edge is necessarily gouge-like. The rare stone gouges sometimes found in the West Indies are probably imitated from the shell tool.

The shoe-horn type is rare in St Kitts. Most of the shell implements here are made from the broadly expanded outer lip of the king-conch. In most cases this is roughly chipped into shape, and care is taken only with the edge. The parallel furrows on the external surface of the shell are sometimes half rubbed down, giving the appearance which Mr im Thurn has mistaken for artificial grooving, but which is perfectly familiar to one acquainted with the shell. A number of tools of a better class occur, the writer is inclined to think, more commonly in the middens than on the surface, though this may be due merely to the destruction of the surface specimens by weathering and tillage. They are carefully ground to the petaloid celt or Scandinavian shape; occasionally they are almost triangular, and broad in proportion to length. Like the celts, the shell implements are of various sizes, from large unsmoothed specimens six inches long to nicely made chisels two and a half inches by half an inch, and neat little wedges two inches long.

A fact worthy of note is that a few short stout wedges are made from the outer lip of the *Strombus accipitrinus*. Rarely long narrow chisels were shaped out of the outer lip of the *Cassis tuberosa*.

Many of the shell adzes found in the middens are quite perfect, their edges not being blunt. It being fairly easy to grind these tools, they were probably kept in good order; and as they were little liable to serious breaking, in this respect unlike stone implements, but few damaged tools would have to be discarded.

From the Christ-church midden was taken a scoop made from the body-whorl of the *Cypræa exanthema*. This part of the shell would make an excellent spoon, but in this case half of it has been removed and the edge sharply beveled (fig. 23). The small end, where a handle may have been affixed, is broken. The scoop is an inch and three-fourths broad and was originally two inches long. On the surface of the Two-mile Hill midden was found a shallow spoon, cut out of the body-whorl of a king-conch. It is two and a half inches by nearly two inches, and about a quarter of an inch deep internally.

ORNAMENTS

A single bead of elongated barrel shape, 11 mm. by 5.5 mm., polished and neatly perforated through its long axis, was taken from the Christ-church midden by the writer. It is of opaque white



FIG. 23. — Shell scoop, Christ-church midden. ($\frac{1}{3}$)



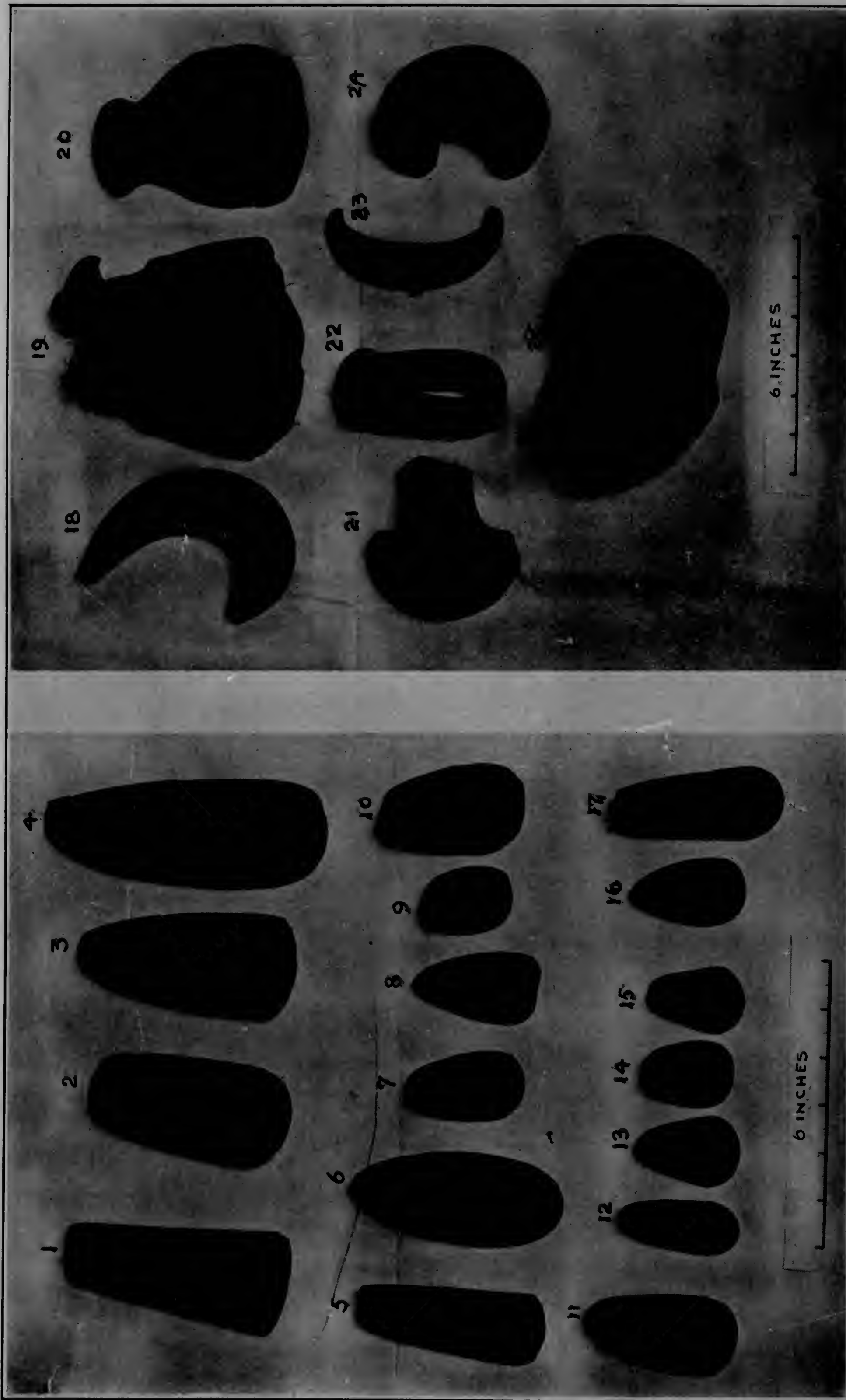
FIG. 24. — Shell amulet from St John's midden. (Nat. size.)

stone, probably quartz, with veins of hornblende. Mr im Thurn figures a shell pendant, shaped like a jaguar's tooth, from Nevis; it is half perforated from each side at one end, but the perforations do not meet.

From the Christ-church midden was also taken the flat valve of a red *Spondylus* with a small hole that was certainly artificially punched.

Figure 24 shows a curious object of conch-shell from the surface of St John's midden. It represents the head of a bird and is worked exactly alike on both sides. Whether merely ornamental or of symbolic significance is not known.

Many of the small shells, which occur in abundance in the middens, have been examined and compared but without establishing any probability of artificial perforation.



STONE OBJECTS IN THE CONNELL COLLECTION

POTTERY

The only entire examples of the potter's art yet found were in the Indian grave previously mentioned. The specimens discovered in this deposit (pl. xxiv, A) are (1) an oval bowl, $9\frac{1}{2}$ inches by 6 inches and $3\frac{3}{4}$ inches deep, with a simple handle at each end, made of coarse dark earth, badly fired, and without ornamentation. (2) A platter, 8 inches by 7 inches, with the lip continued into a spirally curved, perforated handle; there are circular incised lines on the inner surface, extending into the spiral of the handle, and externally a small perforated boss for a suspending string. (3) A number of fragments, most of which have been pieced together so as to render a complete restoration possible (lower right-hand figure of pl. xxii). Thus restored the sherds are seen to be parts of a jar $12\frac{1}{2}$ inches high by $13\frac{1}{4}$ inches in diameter at the rim. There is a simple pattern in white paint applied directly to the well-baked clay.

All of the pottery from the middens is very fragmentary. Only a few pieces are in a condition to indicate with certainty the character of the vessels (in these cases always small) of which they form parts; but in other instances it has been possible, by careful measurements and plotting of curves, to restore the original shapes from single fragments with more or less probability of truth.

The material varies greatly in texture and perhaps in composition. There is also considerable variety in technique, but probably only in accordance with the uses for which the earthenware was designed. Thus, the coarse unpainted sherds of cooking-pots and baking-slabs are so irregular as to indicate that these articles were modeled as is now done by the negroes in Nevis; while some of the lips and reflected edges of jars and basins are finished almost with the true-ness of wheel-turned pottery, showing a high degree of skill in coiling.

There is considerable variety in the forms of the lips of ceramic objects, and as many of them were made with great care, the diversity cannot be attributed to chance. It certainly indicates a degree of individuality of invention on the part of the potters, or at any rate a selection guided by the taste of each artist. The varieties are represented in the accompanying outlines (fig. 25). Numbers 9, 11, 12, 13, 14, and 16 are of dark unpainted ware, some of the pieces

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STONE OBJECTS IN THE CONNELL COLLECTION

being ornamented with incisions. Numbers 1, 2, 5, 8, 15, 17, 18, 21, 22, and 23 show rims of red painted vessels, some with a thick layer of paint, others with a well applied slip. The remainder are from specimens with patterns painted on the plain smoothed surface of clay, without a slip.

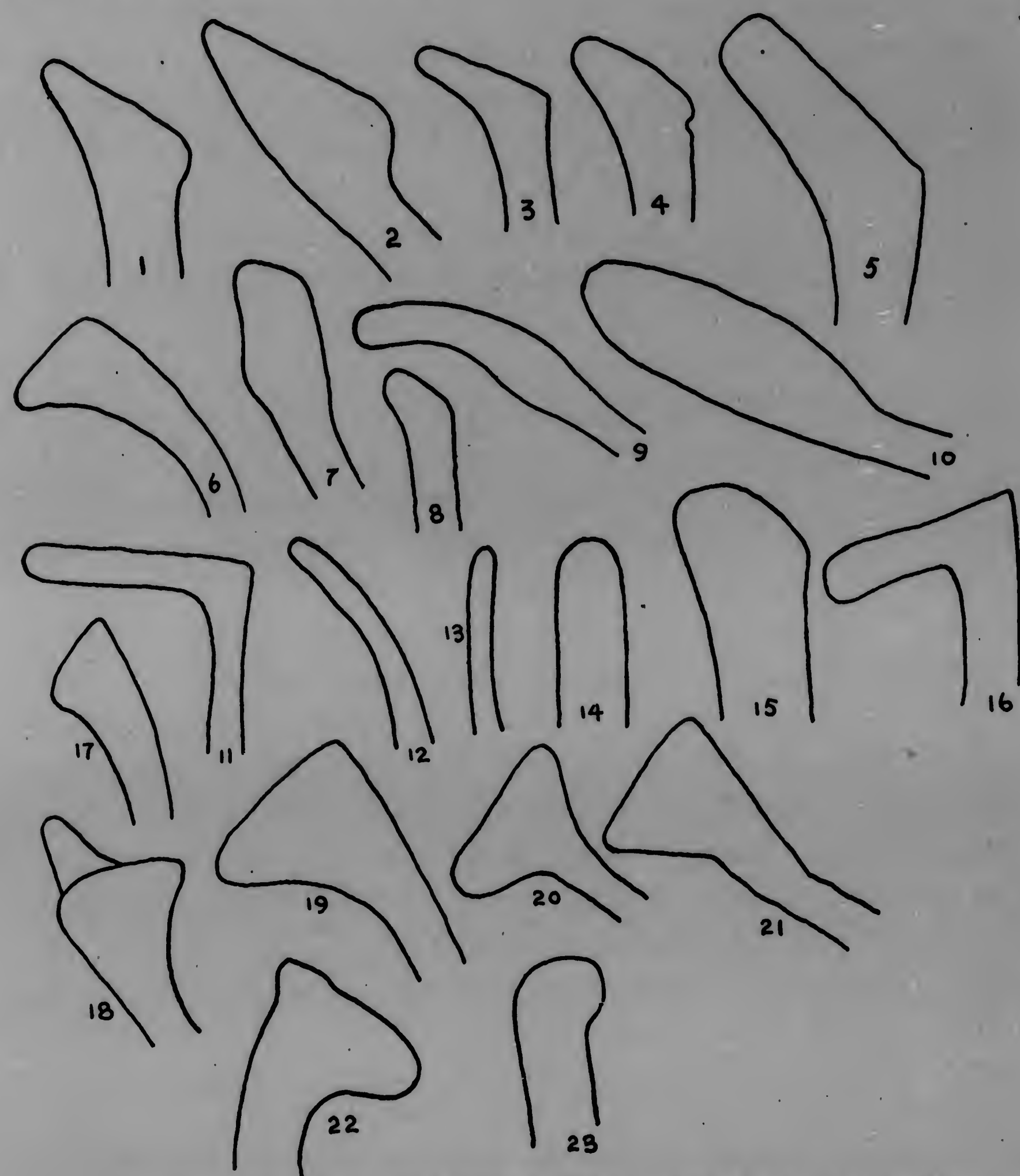


FIG. 25. — Sections of lips of pottery vessels. The right is the inner side in each case. ($\frac{3}{4}$)

The surface of the pottery was often carefully smoothed, especially where paint was to be applied. In other cases the general inequality was rubbed down, but the marks of the smoothing tool are

plainly visible. Some sherds of dark clay show that the vessels were apparently purposely roughened on the outside by drawing a rough piece of wood or coral over the damp clay. The under side of baking tiles is left untouched.

On some vessels red paint is applied thickly over the whole outside or the whole inside, but rarely over both. A thin slip of red paint occurs on other pieces, well fired in so as not to appear as a distinct layer, as is the case with the thick paint, which is now cracking off. A slip of light red, well baked, is also found, but only on highly finished articles. A few very small sherds of unusual thickness, an inch or more, have a cream paint on one side.

The firing of the pottery also varies. The most carefully smoothed objects are extremely well burned, but the direct action of the flame is suggested by discoloration in some cases. The common coarse pots are very friable.

Ornamentation is achieved by means of incised lines and paint. It occurs naturally on the parts most exposed to view — the outside of jars, the inside of platters, and the expanded lips of basins. The incised patterns are all conventional, consisting mostly of straight lines, hatching, and sometimes dots (fig. 26). This form of decoration is found on thin unpainted ware of dark clay. Incisions are occasionally employed on thick painted vessels to define the painted areas. Deep squarely cut grooves, and wide modeled furrows occur on a few sherds of red-painted ware. One or more circular incised lines were drawn in the bottom of vessels of open shape.



FIG. 26. — Incised patterns on pottery.

Painted patterns are also conventional; they are made up mostly of spirals and curves, along with straight lines, as shown in the lower left-hand figure of plate XXII. The patterns are in white or sometimes light blue, on a red ground or on the unpainted reddish clay. One example of an angular pattern is executed in white and light red on dark red. The thick rim of unpainted vessels is usually

painted dark red. A walnut-black stain, probably of vegetal origin, is used inside the lips of basins. The colors used are vermillion, light red, and dark red for slips (orange occurs on part of one well finished article); white and light blue for patterns; and the black stain mentioned above.

The examples of modeling and luting thus far found are almost entirely restricted to handles, which consist of simple ears and bosses and the common loop. A fragment of an earthenware human mask was obtained, showing in part the method of face painting. The skin is of chocolate color, the lips vermillion, and the pattern is in white (fig. 27). Figure 28 shows what seems to be a handle in



FIG. 27. — Fragment of human mask in pottery, from Stone-fort. ($\frac{1}{2}$)

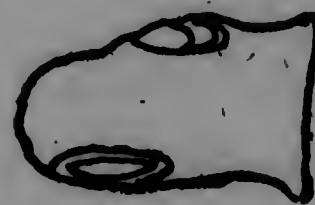


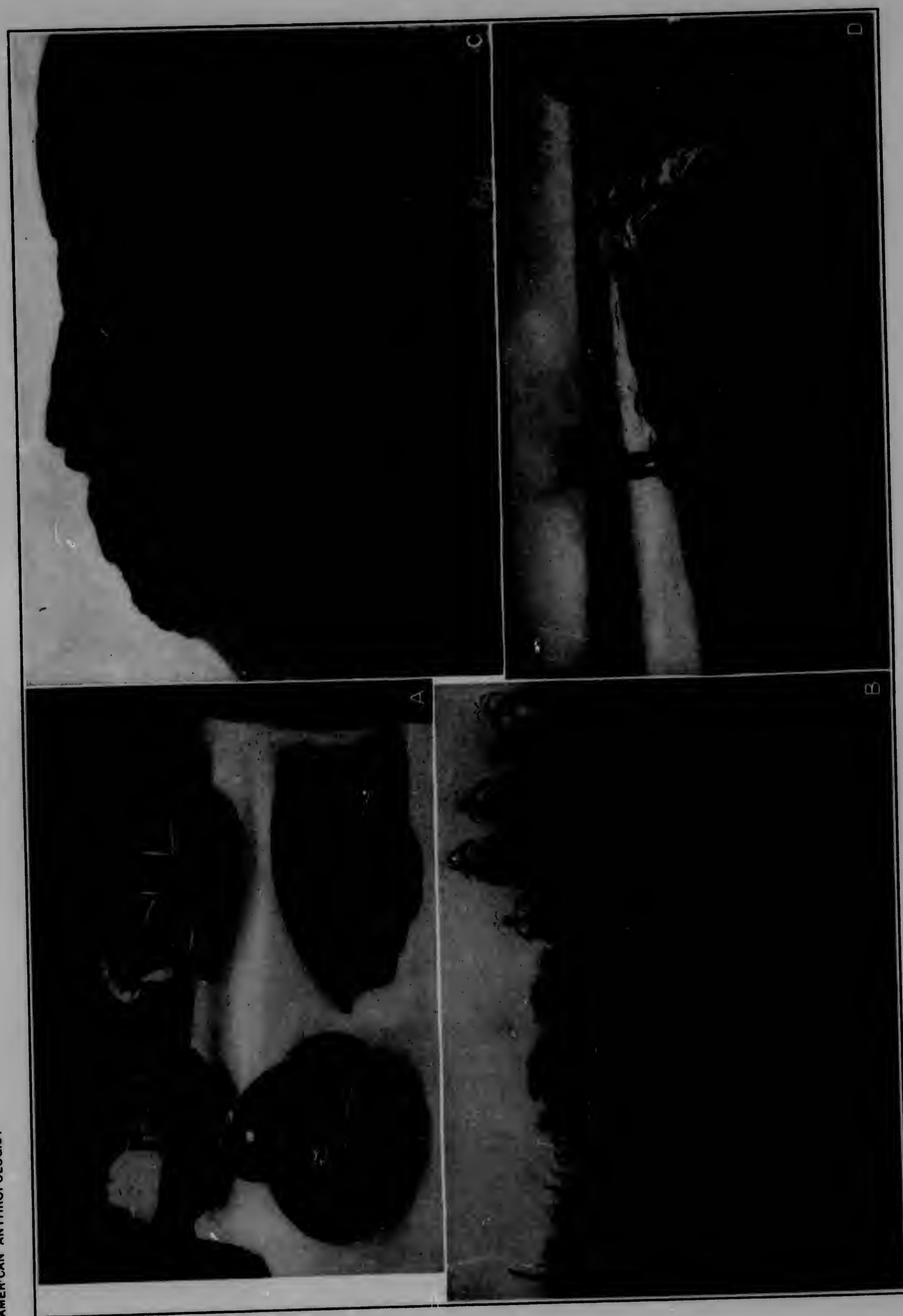
FIG. 28. — Turtle's head in pottery, from Two-mile Hill.

the form of a turtle's head. Another sherd bears what appears to be a prominent eye luted on.

The sherds belong to a variety of vessels and utensils. Fragments of circular baking tiles, an inch thick, with a slightly raised edge, are common. Very numerous sherds of soot-stained cooking pots point to a more or less globular form, but no exact restoration has been possible. The forms of vessels as existing or restored are best described by plates XXII (lower right-hand figure), XXIV, A, and figure 29. Platters, basins, bowls, and jars are the types thus far determined from the fragments. The bottoms are never convex, but are always flat or slightly concave. Several bottoms raised on a foot have been found. From the similarity of material and technique this foot has been provisionally assigned to the type of bowl represented in figure 29.

ROCK CARVINGS

The known petroglyphs of St Kitts occur at four places, but in one case the stone may have been brought to its present position in



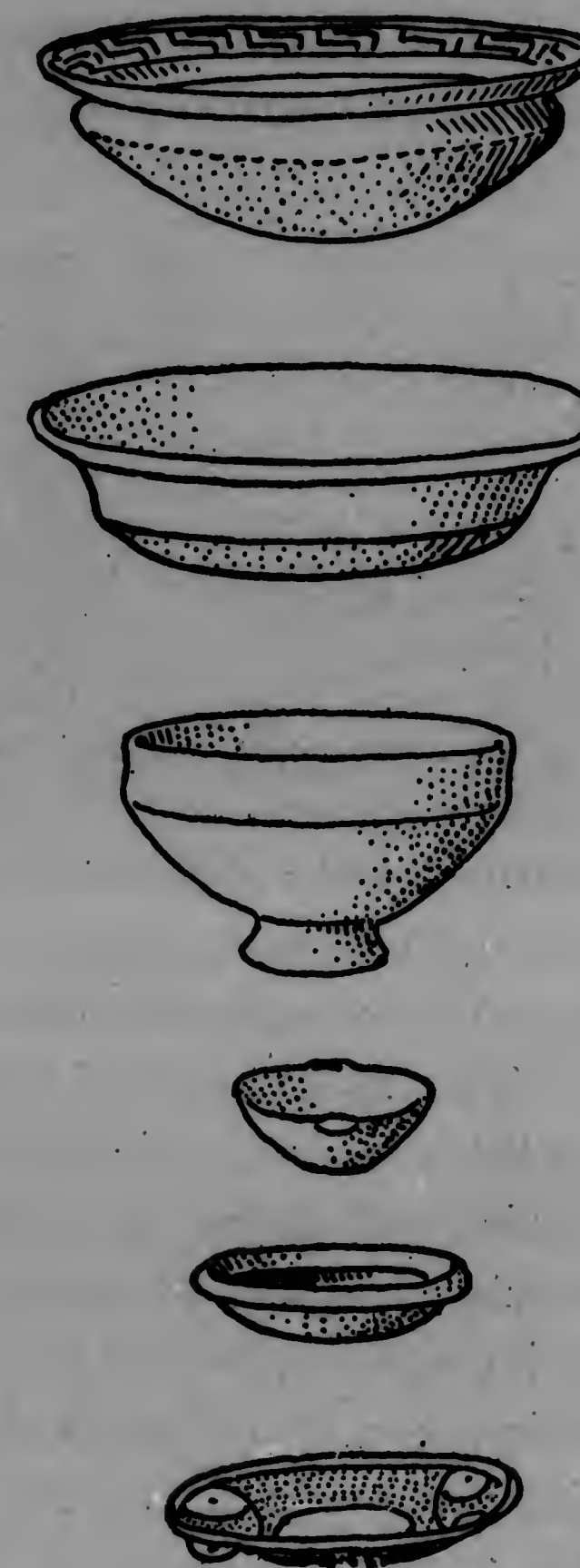
POTTERY AND PETROGLYPHS

recent times. Photographs of some of the petroglyphs have been obtained, after darkening the incisions with charcoal and touching up the high lights with a whitish stone.

At Hart's bay, below West-Farm, there is a large rock (pl. xxiv, c) washed by the sea on one side, while the other side, facing the north and sloping at about 45° , is covered with uncouth figures, many now almost effaced by weathering. The petroglyphs all represent human faces or figures. The incisions are deep, originally perhaps a quarter of an inch, and the rock is the ordinary trap of the island. While having this rock photographed the writer found a smaller one with simple faces cut in the same style (pl. xxiv, d). Both the east and west sides of this stone bear carvings. There are two kitchen middens within half a mile of this spot.

Up Stone-fort ravine, a few hundred yards from the road, the sides of the gut, here about fifty feet high, approach within ten or twelve feet and make a narrow gloomy gorge with perpendicular or overhanging walls. Along both sides are numerous grotesque human faces and occasionally figures, cut in the case-hardened gravel and sandstone. They are for the most part well out of reach, but it is not necessary to suppose that this indi-

cates the fall of the stream-bed since they were made, for the artists had only a limited vein of sand affording a surface suitable for this work. The cliffs are mostly of coarse gravel, with large pebbles and rocks embedded. It must be admitted that with a hard stick it is comparatively easy to mark the sandstone, and some of the faces, low down on the west wall, were perhaps made or retouched by idle hands.

FIG. 29. — Restorations of pottery. ($\frac{1}{10}$)

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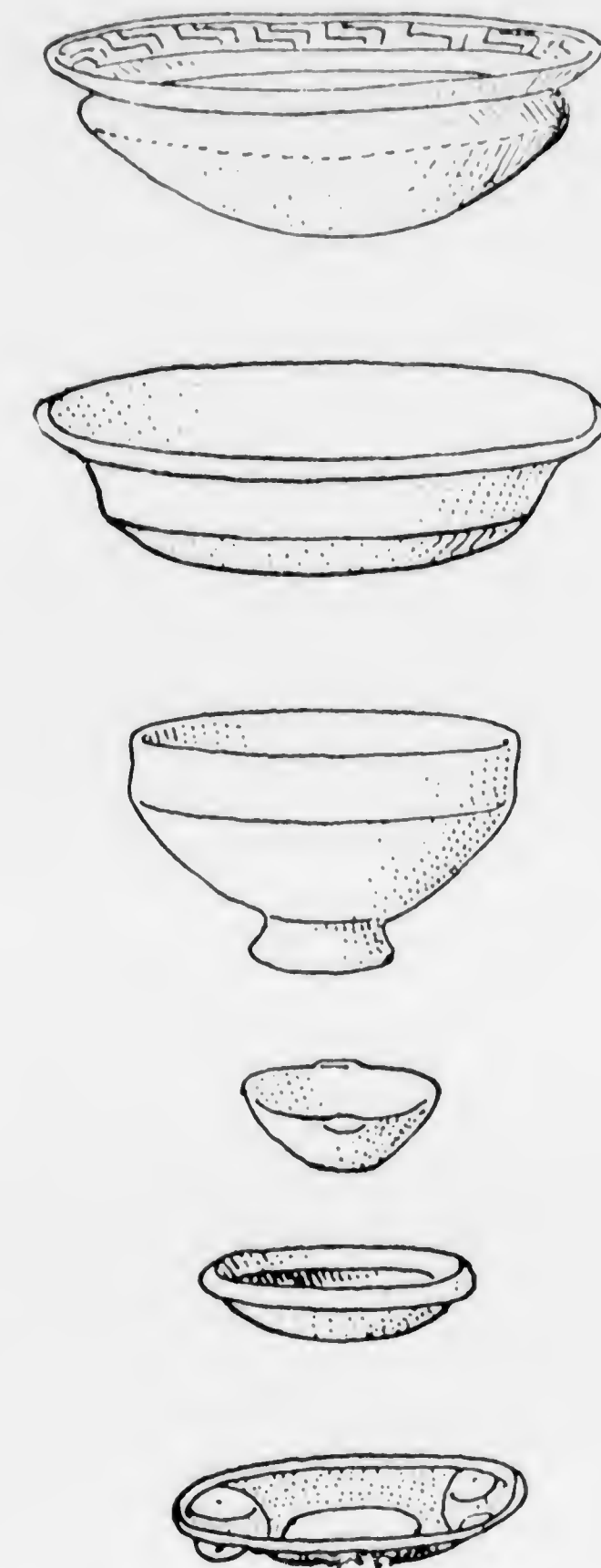
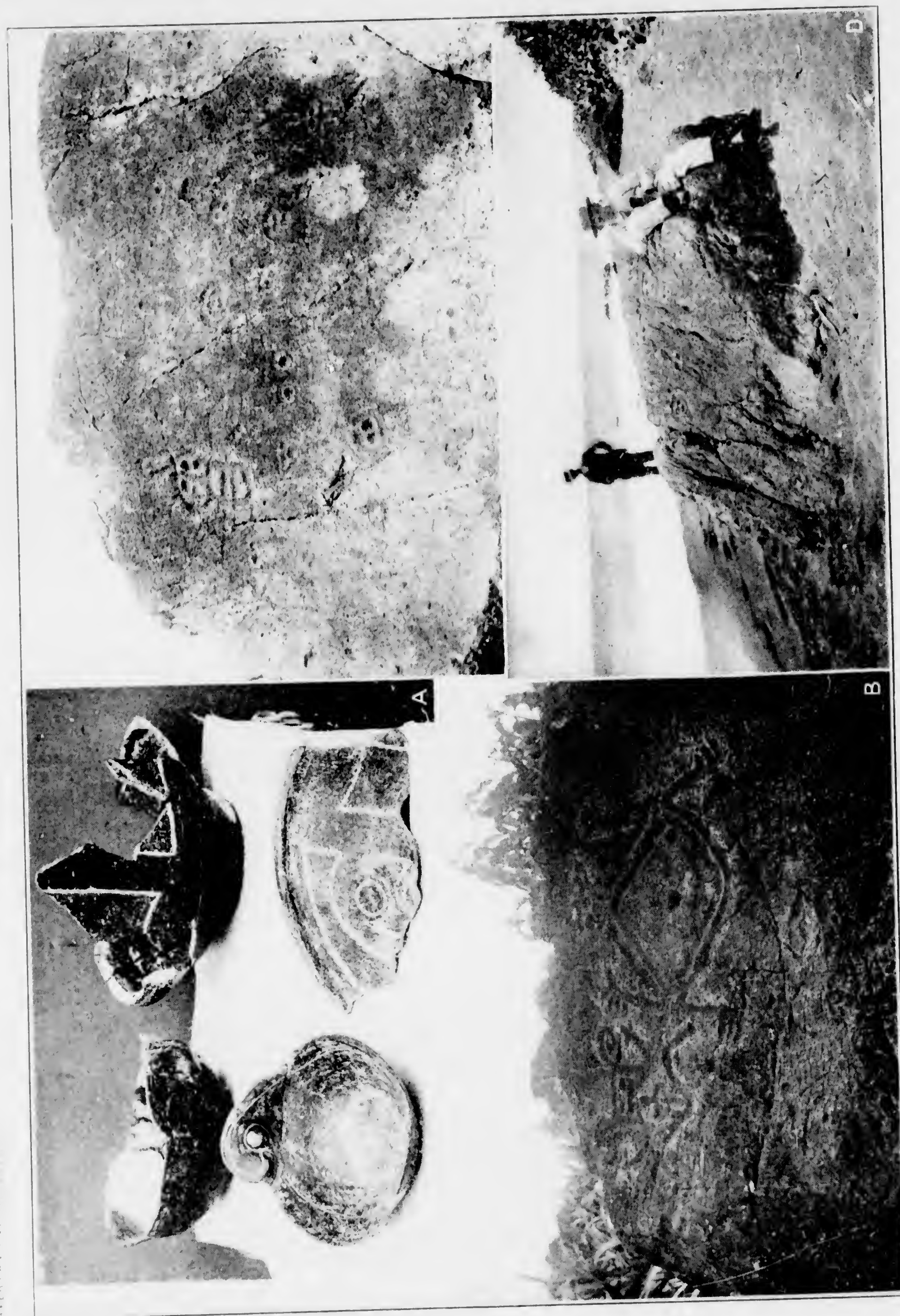


FIG. 29. — Restorations of pottery. ($\frac{1}{16}$)



POTTERY AND PETROGLYPHS

Local tradition has assigned an ancient date to the carvings; the story is that a battle having taken place between the English and French settlers, the latter were defeated and driven up the gorge. While hemmed in here, and before they were finally massacred, they amused themselves by sketching on the walls of their prison, according to the usual custom of historical prisoners. The stream bears the alternative name of Bloody river to this day. The actual petroglyphs at this place number more than a hundred. Of the cer-

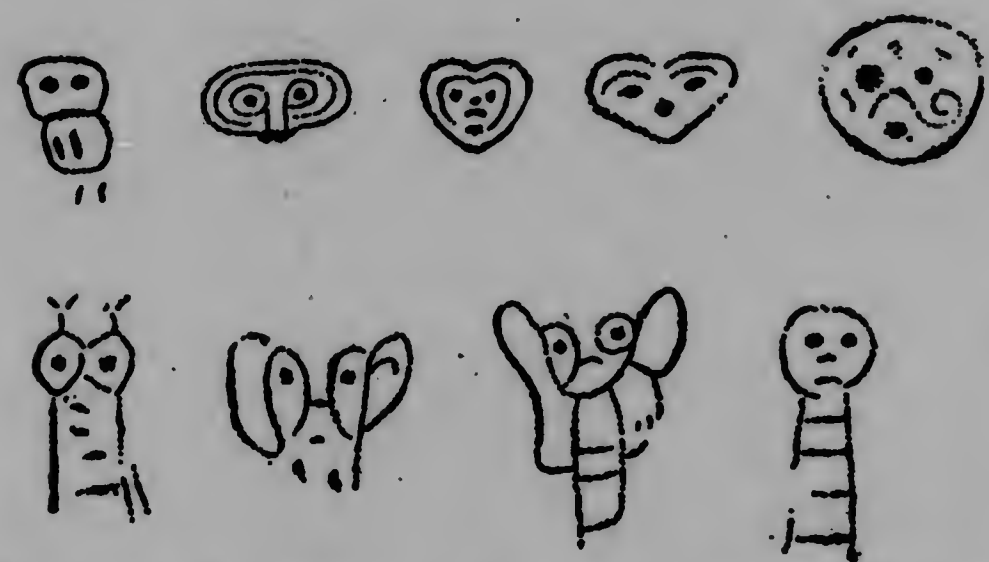


FIG. 30.—Petroglyphs in Stone-fort gorge, St Kitts.

tainly genuine Indian works, a few of the best preserved are represented in figure 30. They do not lend themselves to photography, although one satisfactory plate showing two eccentric figures was obtained. There are other large and comparatively elaborate heads which the writer hesitates to figure, although himself sure of their Indian origin, because of the slight doubt manifested by others on this point.

The finest example of rock carving probably in the Lesser Antilles occurs at Wingfield estate. In a cane-field, about thirty yards from the road up to the works, occur a group of boulders of purely natural form and arrangement. The largest of these presents a flat surface, inclined at about 30° and facing almost north, on which are two figures, locally called the "Man and Woman." They measure 32 by 27 inches, and 24 by 18 inches, respectively (pl. XXIV, B). The chief lines are half an inch deep and two inches wide. The larger is a human figure with an enormous belly on which the navel is indicated. The head is small and simple, consisting of eyes and a mouth enclosed in a broad face, like some of the simple etched figures at Hart's bay and at Stone-fort, but in this case it has large ears. The smaller figure, also human, has a large square head with two curling plumes. The body is represented by a straight line intersecting a small circle. Both figures are drawn in a squatting posture, and the limbs are treated in the same conven-

tional style as in some of the deep petroglyphs of British Guiana. A trace of a third face is seen on the right of the photograph.

At Willett's estate, on the north side of St Kitts, to the rear of the manager's house, is a flat, natural slab, 3 feet by 2 feet and 6 inches thick, bearing petroglyphs (see figure 31). It has been placed, no one knows when, by some gentleman with antiquarian instincts, on a rough masonry pedestal, with the view no doubt of preserving the carving; but in these utilitarian days the stone has been found convenient in washing the clothes and in grinding the chocolate for the family, and in consequence the petroglyphs are almost effaced. It is with difficulty that the details of the chief figure can be made out; it is 10 inches long by 7 inches wide at the base; the lines are half an inch broad and were very shallow; they are now marked only by being still rough while the general surface of the rock is worn smoother. One may imagine that the figure represents the front view of a man sitting cross-legged. The head has large pendulous ears. There is another face on the rock, and traces of several others of the simple eyes-and-mouth type.



FIG. 31.—Petroglyph at Willett's, St Kitts.

These rock engravings do not present much mutual resemblance. With the exception of the Stone-fort faces, they are all cut in hard rock. The incisions are generally deep, especially the eye-holes. The eyes surrounded by circles, like goggles, are seen at Hart's bay and at Stone-fort. This form occurs in Jamaica.¹ The general style of the Wingfield figures is that of the deep carvings of British Guiana.² The Willett stone slightly resembles the petroglyph in St Vincent figured by Ober.³

MIDDENS

The writer has been able thus far to locate the sites of six Indian settlements in St Kitts and two in Nevis.

The new road cut by Governor Haynes Smith round Stone-fort passes through the steep slope of the hill to reach the edge of the

¹ Duerden, *Indian Remains of Jamaica*.

² im Thurn, *Among the Indians of Guiana*.

³ *Camps in the Caribbees*.

shore-cliff, along which it then runs. The new cutting exposed a midden that was very rich in debris. Claws of the land-crab and occasionally of sea-crabs, shells of the whelk (*Turbo pica*), queen-conch (*Cassis tuberosa*), king-conch (*Strombus gigas*), and several others, fish-bones, bones of birds and a small mammal are extremely plentiful, while fragments of shells and bits of coral and sherds of pottery complete the refuse. A few conch-shell implements have been recovered. No systematic excavation of this nor of any other midden has been undertaken.

In the field above West-farm estate fragments of Indian pottery were found in a roadside cutting. Within a few yards of this spot was an Indian grave.

Where the road passes through Two-mile hill, below Johnson's estate, fragments of pottery, broken shell, crab-claws, and shell implements are scattered freely on the field and in the roadside cutting. A shell spoon was picked up on the surface at the roadside, and conch-shell implements are particularly abundant on the fields in this vicinity.

At the edge of the road, in the field facing the village of Cayon, Indian pottery has been found associated with broken shells, etc. These four sites are in close proximity to streams.

In the field abutting Christ-church cemetery there is a rich deposit of aboriginal debris. Where the pits dug for "rain traps" expose a few feet below the surface, fragments of pottery, a stone bead, and a shell scoop have been found associated with crab-claws and fish-bones, as well as great quantities of small shells — nerita, monodonta, fissurella, joints of chiton, etc. The shells here found still retain their natural colors to a great extent.

In the field opposite St John's school may be found fragments of pottery of the same type as in the other middens, and associated with broken shell (mostly of the smaller kinds as at Christ-church), occasional fish-bones, and shell implements. An incisor of an agouti, and a piece of coral very much worn by rubbing at one margin were found here, and a piece of a stone baking-slab, a shell amulet, and a pendant were also procured from this site. These two last mentioned sites are on the northern side of St Kitts, far from any stream or other fresh water. Springs may be found in the mountains, but at a distance of more than a mile from either of these spots.

At Butler's estate, in Nevis, there is a field which has always borne the name of "Indian camp." On examination it proved to be profusely strewn with broken shell and very fragmentary pottery; indeed the latter was scarcely distinctive of Indian work.

At New River estate, in Nevis, Mr W. Maynard found a fine stone celt while having a trench dug. The writer afterward visited the spot in his company and found it to be undoubtedly a midden. A little digging was done and a number of fragments of pottery and several shell adzes were unearthed. The former afforded some good examples of Indian work.

The prevalence of fragments of coral among the Indian debris is significant. They were certainly used for filing, rasping, and smoothing objects of wood, or perhaps even shell and bone. One piece that shows decided marks of continued use has been collected. The flint flakes have already been commented on. Common water-worn pebbles with marks of hammering were very probably used by the Indians, but such protoliths are natural to man of all stages of culture, and no notice has been taken of them by collectors.

MORTUARY REMAINS

It has already been mentioned that pottery associated with human leg-bones were taken from a gut-side at West-farm. On visiting the place a few months later, the man who originally made the find was able to identify the exact spot, and excavation from the top of the little cliff revealed the skull, which, with as many of the bones as could be handled, were removed. Nothing else was found with them.

The body was buried facing the east, in a sitting position with the arms crossed and the fingers resting on the shoulders. The face was upturned. The pottery had been placed evidently in front of the feet. The bones are those of a male adult. The occiput was flattened to such a degree that the outline of the back of the neck must have continued straight up to the vertex. Unfortunately, before the bones were prepared with glue to allow of handling and measuring, the facial and basal parts of the skull suddenly crumbled away. The earth of St Kitts appears to have a remarkably disintegrating effect on bone.

ST VINCENT,
WEST INDIES.